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Skeptical Inquirer

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OLIVER SACKS INTERVIEW

Nurturing Non-Science: Startling Concepts in Physician Education

Climate Change Denial in the Classroom

New Revelations on 'Best Monster Photo'

SPECIAL REPORT: Bizarre Bigfoot DNA Study

Valuing Science with Differing Values

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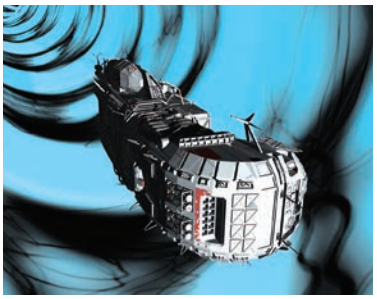

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[FROM THE EDITOR

Admiration and Disapprobation

Count us among the countless admirers of Oliver Sacks. The good doctor Sacks, a professor of neurology at New York University, is respected as much for his literary talents as for his scientific insights. He writes frequently for *The New Yorker*, and his books have been best sellers. They gracefully describe an amazing variety of neurological disorders, often involving scrambled senses. In this issue, neuroscientist and CSI Fellow Indre Viskontas interviews Sacks on the subject of his latest book, hallucinations. It is an entertaining read. I also think you will appreciate his insights about the differences between hallucinations and religious visions and his appropriately dubious comments about the neurosurgeon who in *Newsweek* and in a best-selling book claims he has *Proof of Heaven*.

* * *

So-called alternative medicine (or SCAM) is not so subtly making its merry way into medical schools. Evidence-based medicine in medical schools is more and more accompanied by something not so evidence-based. And few medical leaders are paying attention. We highlighted some of the issues in a write up in our March/April issue titled "Quackademic Medicine: Teaching Pseudoscience in Medical Schools." That was based on a session at our CSICon Nashville 2012 conference featuring physicians David Gorski, Harriet Hall, Steven Novella, and Kimball Atwood, plus Eugenie C. Scott of the National Center for Science Education. At the end we promised a future full-length feature article.

That article is in this issue. Eugenie V. Mielczarek, emeritus professor of physics at George Mason University, and Brian D. Engler, on the affiliate faculty of George Mason, return to our pages with a detailed study of millions of dollars in federal grants for curricula development to major medical schools from the National Center for Complementary and Alternative Medicine, that controversial unit of the respected National Institutes of Health. It is a follow up to their earlier SI article (January/February 2012) on troubling concepts in NCCAM *research* grants. Now in "Nurturing Non-Science: Startling Concepts in the Education of Physicians," they examine grants given for physician training in such things as acupuncture, magnets, Reiki, Therapeutic Touch, Qigong, nauturopathy, and other unproved or disproven techniques. Teaching these concepts, some of which violate the laws of physics, to our future doctors is troubling. It lends the practices undeserved credibility and ensures they'll continue to cause confusion and problems for decades to come.

* * *

There's much more in this issue. On the monster front, Sharon Hill reports on a sensational claim of Bigfoot DNA evidence. She raises a litany of serious questions about the claim and its publication in a new journal apparently obtained by proponents just to publish the report. It is hard to see how this latest episode will bring any credibility to a field sorely lacking just that. And Robert Bartholomew uncovers documents raising new questions about the "world's best lake monster photo," the Mansi photo of Lake Champlain's Champ. It's not been a good month for our friendly neighborhood monsters.

Kendrick Frazier

Skeptical Inquirer™

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Battle of the Op-Eds: Scientists Defend Reality of Climate Change

The comment and analysis below by physicist Dave Thomas, president of New Mexicans for Science and Reason, and signed by seventeen members of NMSR, was published as an op-ed column in the Albuquerque Journal. *They wrote it to counter a column the newspaper had published a few days earlier. That column, titled "Climate Change Fearmongers' Lose Ground to Data," by E. Thomas McClanahan of the* Kansas City Star *editorial board, argued that global warming has actually ceased since 1998, that the "Climate Gate" scandal of 2009 was a "major blow" to the theory of global warming, and that scientists had deceptively shifted from "global warming" to "climate change."*

At the same time, in a complementary effort, Kendrick Frazier, a science writer and the editor of the Skeptical Inquirer *(and also an Albuquerque resident), wrote and submitted his own letter to the* Journal *in response to part of the original op-ed. That letter was not published.*

We here now publish the original uncut text of the Thomas et al. op-ed and a slightly updated text of the Frazier letter. The originals of both also have appeared in the NMSR Reports *newsletter and are available online at nmsr.org.*

Writer Wrong on Climate Change

Science Shows That Changes Are Indeed Occurring

David E. Thomas

You have recently published a series of op-ed pieces casting doubt on the very existence of global warming caused by human activity, the most recent being that by E. Thomas McClanahan on January 25.

Your readers should be aware that the national scientific academies worldwide (not the governments) of the United States, the United Kingdom, and the eleven other G5+8 countries all agreed in 2009 that "Climate change is happening even faster than previously estimated; global CO_2 emissions since 2000 have been higher than even the highest predictions, Arctic sea ice has been melting at rates much faster than predicted, and the rise in the sea level has become more rapid."

We hope McClanahan would agree that his dissent from the mainstream science merits close intellectual scrutiny. We therefore offer these critical observations.

• McClanahan's assertion that "global warming" has been renamed "climate change" to cover for real warming "stopping" in recent years is ludicrous on many levels.

Predictions of global warming from human emissions of carbon dioxide date back to 1896. The expression "climate change" appears in physicist Gilbert Plass's landmark 1956 article "The Carbon Dioxide Theory of Climatic Change," while the term "global warming" was coined somewhat later (Wallace Broecker, "Climatic Change: Are We on the Brink of a Pronounced Global Warming?" 1975).

It was the Bush strategist Frank Luntz, in a 2003 memo, who suggested that GOP politicians refer to "global warming" as "climate change" to make it sound less frightening. It also proposed making a supposed lack of scientific certainty a "primary issue" in the political debate on climate.

• McClanahan attempts "guilt by association" by conflating "greens" with "scientists." Certainly, not all scientists are environmentalists, but the great majority of scientists actively researching and publishing on climate change agree that humans are causing most if not all global warming by releasing

greenhouse gases into the atmosphere.

• Anthony Watts is not a research meteorologist, and only has the training needed to read the weather on television. He is funded by the denialist Heartland Institute, and uncritically channels material from web postings. Understanding Earth's climate requires more work than simply doing a Google search for "global warming."

McClanahan appears to have a connection to the journalism business. He should be aware that both scientists and journalists have a professional obligation to check facts, and to tell the truth.

• McClanahan says that the so-called "Climate Gate" scandal was a "major blow" to the theory of global warming. What happened was that the technical jargon used by one scientist at one small university in one stolen email was claimed to be evidence of "fraud," but only by those who already believed that "climate change is a myth." Numerous investigations by state and national agencies on two continents have cleared the scientists involved of any scientific wrongdoing.

• McClanahan says there has been "no significant warming since 1998." This is simply wrong—there has been significant climatological warming since that year. The word "climate" refers to a multi-year average, and the climatic average temperature is significantly higher now than it was in 1998. If a stockbroker advising a client misrepresented one cherry-picked single value as a trend, the same way McClanahan misrepresents global temperature, that broker would lose his license, and perhaps go to jail.

McClanahan appears to have a connection to the journalism business. He should be aware that both scientists and journalists have a professional obligation to check facts, and to tell the truth. His claim that "global warming seems to have ceased" is factually false.

If you want to believe that climate change is just a "liberal hoax," then you will only find validation in the pseudoscience put forth by pundits like McClanahan and Watts. If you would like to know why real scientists are worried, go to a meeting like the American Geophysical Union, where the debates over the details are fierce and passionate, but where deniers of the reality of human-caused global warming are virtually nonexistent.

Our professional colleagues who study the Earth's past and present climate are very alarmed by what they see happening now. Those who are currently traveling to the Arctic, Greenland, and the Antarctic are bringing back worrisome observations of increasing large-scale glacial melting and calving. The climate crisis is every bit as real as our current economic doldrums, and potentially far more costly in the long run.

David E. Thomas is president of New Mexicans for Science and Reason (NMSR). A physicist/mathematician, he is also a Committee for Skeptical Inquiry Fellow. This column was drafted by NMSR members Dave Thomas, Mark Boslough (also a CSI Fellow), Paul Braterman, and Kim Johnson and signed by them and thirteen additional members of NMSR: Ted Cloak, Marilyn Savitt-Kring, Steve Brugge, Marshall Berman, Terry Dunbar, Robin Brewster, Harry Murphy, Nancy Shelton, Jerry Shelton, John Derr, Marvin Mueller, Marvin Moss, and Rocky Stone.

World Still Warming

Kendrick Frazier

The op-ed syndicated column "'Climate Change' Fearmongers Lose Ground to Data" (January 25) badly misconstrues the facts.

It was inevitable that as soon as the National Oceanic and Atmospheric Administration announced on January 15 that globally 2012 was the tenth warmest year on record (ninth warmest according to NASA, which uses slightly different techniques), some would try to twist that news to imply that global warming is over, exaggerated, or no longer a concern. Hardly. Only nonscientific ideologues assume that a short-term dip in any long-term rise in an average invalidates the rising trend.

Here are a few things the column conveniently failed to mention (they are in the same NOAA State of the Climate report, available at www.climate.org):

For every single year since 1976, global temperature averages have been above the long-term average (records have been kept since 1880). Think about that. For thirty-six years in a row temperatures have been warmer than the long-term average.

During that period, every decade has been warmer than the previous decade. And, despite the less-than-record temperatures of 2012, the first three years of the present decade are warmer than the first three years of the previous decade.

Including 2012, all twelve years to date in the twenty-first century (2001–2012) rank among the fourteen warmest in the 133-year period of record. Only one year during the entire twentieth century—1998—was warmer than 2012.

Most areas of the world experienced higher-than-average temperatures in 2012.

The long-term trend is still up, noticeably. The physics of the main greenhouse gas, carbon dioxide (annual levels rising every year since measurements began in 1958), show why the warming is happening and dictate that these warming trends will continue.

It is belittling and disingenuous to pretend climate scientists are fearmongers. In fact they are being responsible scientists, accurately monitoring and understanding our changing climate as best they can, and warning that we are altering our own atmosphere in ways that may endanger our well-being. ■

Archaeologist Sues *Indiana Jones* Makers over Hoaxed Crystal Skull

Benjamin Radford

A prominent archaeologist in Belize is suing the makers of the film *Indiana Jones and the Kingdom of the Crystal Skull*, claiming that the story is based upon a national treasure looted nearly a century ago from the small Central American country. According to the *Hollywood Reporter*,

> Dr. Jaime Awe, director of the Institute of Archeology of Belize . . . is suing on behalf of the nation of Belize over the Crystal Skull artifact, popularized in the 2008 Steven Spielberg film *Indiana Jones and the Kingdom of the Crystal Skull*. Awe is demanding the return of the Crystal Skull from a treasure-hunting family that allegedly stole it 88 years ago from Belize.

Awe is suing Lucasfilm, the Walt Disney Company, and Paramount Pictures. Awe states that the crystal skull described in the film was stolen by a British explorer (and sometime archaeologist) named F.A. Mitchell-Hedges during a visit to the Maya ruins of Lubantuun in the jungle of Belize in the early 1920s. His adopted daughter Anna Mitchell-Hedges is said to have discovered the skull while exploring the ruins. They returned to England with the skull, and Anna regularly exhibited the skull after her father's death in 1959.

In his complaint Awe cites a 1928 "Antiquities Ordinance" that prohibited the removal of artifacts from Belize without express government permission. Since the crystal skull was illegally removed from the ruins and used as a basis for the most recent Indiana Jones film, Awe and Belize want a cut of the profits and the return of the stolen skull, which they see as part of their cultural heritage.

It's unlikely that the lawsuit will go anywhere—mostly because (apparently unbeknown to Awe) it's based on a famous hoax. Research done by Daniel Loxton, Joe Nickell, and others has proven that neither Anna nor her father found the skull amid the Lubantuun ruins or anywhere else. The historical record shows that Mr. Mitchell-Hedges bought the skull from an antiquities collector named Sydney Burney in 1933, and that he later sold it to pay a debt. It was later purchased by his daughter Anna, who made up an adventurous story about finding it on her seventeenth birthday in the jungle ruins of a lost city.

The hoax lasted for decades and fooled hundreds of crystal skull enthusiasts. Since the Mitchell-Hedges skull

was never even in Belize—much less found there in an ancient Maya ruin by an adventurer's teenage daughter—the Belizean government has no claim over it. It's all a myth.

It's not surprising that New Age crystal gazers were fooled by the bold hoax, though to have the director of the Institute of Archeology of Belize file a lawsuit against Lucasfilms and Disney based upon it is another matter.

Benjamin Radford is deputy editor of the Skeptical Inquirer.

Psychologists' Paper on Conspiracist Thinking Stimulates More of It

Kendrick Frazier

When psychologists disseminated their paper about conspiracist thinking in the rejection of scientific ideas, the almost immediate result in the blogosphere was more conspiracist thinking.

They've now written a second paper documenting that "recursive" phenomenon.

Stephan Lewandowsky and colleagues at Western Australia University have been publishing a series of very interesting psychological papers about resistance to scientific findings. One of them, "NASA faked the moon landing—therefore (climate) science is a hoax: An anatomy of the motivated rejection of science," caused the recent fuss. It was accepted for publication in the journal *Psychological Science*, but before that their university issued a news release and Lewandowsky put the paper online. That, he told Skeptical Inquirer, "was enough to get the attention rolling."

The rest is documented in their second paper, "Recursive Fury: Conspiracist ideation in the blogosphere in response to research on conspiracist ideation," accepted in February by *Frontiers in Psychology* (www.frontiersin.org). Authors Lewandowsky, John Cook, Klaus Oberauer, and Michael Hubble systematically analyzed responses that questioned the first paper's conclusions that conspiracist thinking was associated with the rejection of climate science and of other scientific propositions such as HIV and AIDS and the link between lung cancer and smoking. (Lewandowsky is recipient of a Discovery Outstanding Researcher Award from the Australian Research Council.)

(Continued on page 9)

Robert A. Steiner (1934–2013)

Robert Sheaffer

Magician and skeptic Robert A. Steiner died January 4, 2013, in a nursing home in Concord, California, at age seventy-eight. A longtime resident of the San Francisco Bay area, Steiner was a Fellow of the Committee for Skeptical Inquiry and spoke at several CSI(COP) conferences. A professional magician, he was a former president of the Society of American Magicians and a member of the Magic Castle in Hollywood. He also was a Certified Public Accountant.

Any social event where Steiner was present typically had him giving an impromptu public demonstration of "psychic powers." He always explained to audiences afterward that he had fooled them with a trick. He was also a life member of Mensa and frequently hosted social events for Mensa, for skeptics, and other friends at his home in the East Bay. These events also typically included a demonstration of his "psychic" powers, always delivered with humor. For a number of years, Steiner sponsored an annual Leap Year's Day party, whether or not the year was divisible by four. Always held on February 28, at midnight it would be determined whether or not the year was a Leap Year by polling the guests' calendar watches to see how many read February 29 and how many read March 1.

Steiner and I were close friends for many years. In 1982, he and I founded the Bay Area Skeptics, a local skeptics group that is still operating. Steiner was also a close friend of fellow magician James "The Amazing" Randi and knew practically everyone in the magic world. One time when Steiner and I were on a flight going to a CSICOP conference, he spotted fellow magician Harry Blackstone Jr., who greeted him as an old friend. Steiner was also a close friend of Wallace Sampson, MD, one of the leading scientific critics of "alternative medicine." Sometimes Sampson and Steiner would do a joint presentation on bogus medical practices, and Steiner would demonstrate the kind of "psychic surgery" practiced in the Philippines, appearing to pull copious amounts of (chicken) guts from the abdomen of a surprised "patient."

Steiner performing magic at a Mensa party he hosted in his house.

Any social event where Steiner was present typically had him giving an impromptu public demonstration of "psychic powers."

Concerned about a steady parade of foreign "psychics" who were uncritically accepted during tours of Australia, in 1984 the Australian Skeptics arranged for Steiner to travel Down Under to perform as psychic Steve Terbot. "Terbot" did numerous major TV and in-person appearances. Nobody saw anything fishy about him. The media almost never bothered to check Terbot's credentials. ("There are no credentials in a field that studies something that does not exist!" Steiner once said.) Terbot became an instant psychic celebrity. He appeared on the widely watched *Tonight with Bert Newton* show three times: twice as "psychic" Steve Terbot, the third time as skeptic Bob Steiner, explaining how he had fooled millions of people (see http://www.skepdic.com/steveterbot.html).

Steiner coordinated the entire Bay Area operation of James Randi's elaborate "sting" of the televangelist Peter Popoff, who was receiving "messages from God" via a concealed radio receiver in his ear. (Steiner invited me to participate, but because of work and family commitments I could not. As a consequence of their strict secrecy, I did not even find out the nature of the sting they had under way until its completion.) Steiner lined up communications expert Alec Jason and the primary "patient," Don Henvick, who three separate times was miraculously chosen from among thousands to be "healed" by Popoff, the last time in drag.

While living in New Jersey during the 1970s, Steiner ran for Congress as a Libertarian Party candidate. He was the author of *Don't Get Taken* (Wide-Awake Books, 1989), a book on how to protect yourself from frauds and scams. He wrote the article on cold reading in the *Skeptical Encyclopedia of Pseudoscience* (Michael Shermer, editor). His contributions to the skeptical movement were valuable; he will be missed.

Robert Sheaffer has written SI's "Psychic Vibrations" column for over thirty years. He blogs at BadUFOs.com.

Using established criteria to identify what they call conspiracist ideation, they showed that many of the hypotheses exhibited "conspiratorial content and counterfactual thinking."

They define conspiracist ideation, or thinking, as a propensity to explain a significant political or social event as a secret plot by powerful individuals or organizations. Much of the spread of such thinking in regard to rejection of certain scientific ideas involves the Internet, which provides a platform for individuals who reject a scientific consensus to affirm each others' ideas. Some Internet sites have therefore become hubs of science denial. The authors note that the rejection of climate science has been particularly infused with notions of a conspiracy among scientists.

When the first-mentioned Lewandowsky et al. article (its coauthors are Oberauer and Gilles E. Gignac) became available on the Internet in June-July 2012, the climate blogosphere responded with intensity. Some complained to the authors' university alleging scientific misconduct. Multiple reanalyses of their data were posted on blogs purporting to show the effects didn't exist. And a number of hypotheses were generated that had conspiracist content.

The authors judged the responses by six psychological characteristics of conspiracist content. These included seeing an alleged nefarious intent, a pervasive self-perception as victims of organized persecution, the idea that nothing happens by accident, a fixed belief that the "official" version of anything is wrong, and the interpretation of contrary evidence as evidence *for* a conspiracy. (For an example of the latter, the exoneration by multiple commissions on two continents of climate scientists in the notorious hacked emails controversy is seen as evidence of a still wider conspiracy.)

Bloggers generated no fewer than twelve conspiracist hypotheses in responding to the first Lewandowsky et al. paper. Common to all of them was an alleged nefarious intent of the authors. Initially, hypotheses focused on the psychologist authors, but some eventually grew in scope to include university executives, a media organization, and the Australian government.

The authors conclude that the overall pattern of the blogosphere's response to their paper illustrates "the possible role of conspiracist ideation in the rejection of science" although being cautious scientists they add that "alternative scholarly interpretations may be advanced in the future."

As one supportive commentator wrote on the journal's website: "It is astonishing that the deniers have so little insight that they don't realize that the best approach to refuting accusations of conspiracist ideation is *not* to imagine wilder and crazier conspiracies!"

The work has implications for understanding science denial and for communication of scientific results to the public. Given that an overwhelming majority of climate scientists believe that climate change and global warming are happening, the authors ask what cognitive mechanism would underlie people's dissent from the consensus? Their short answer is the conspiracist idea that the scientific consensus is itself the result of a secret conspiracy among researchers.

"The ideation of a secret conspiracy among researchers can serve as a 'fantasy theme' that permits groups to develop and share a symbolic reality," the authors say. "Such fantasy themes (e.g., the denier as 'Galileo' who opposes a corrupt iron-fisted establishment) operate as bonding agents that build group cohesion by creating a shared social reality."

A defining aspect of conspiracy thinking is its resistance to contrary evidence, so the implications for science communicators are serious. Providing additional scientific information may have a "backfire" effect, reinforcing the rejection of the evidence rather than fostering its acceptance. Such backfire effects are beginning to be well understood, and Lewandowsky and colleagues are among those who have contributed to that understanding (see Lewandowsky, Ecker, et al., 2012, "Misinformation and its correction: Continued influence and successful debiasing. *Psychological Science in the Public Interest*, 13, 106–131).

As a result they argue against direct engagement with *radical* climate deniers (the roughly 6 percent of respondents in one survey who deny climate is changing). This subgroup tends to operate in a closed-system "echo chamber." It is mostly immune to facts and evidence and has the ability to generate the appearance of a widely held opinion disproportionate to the small number of people who actually hold its views. Emphasizing the breadth of the consensus among scientists is, Lewandowsky and colleagues conclude, still the best thing to do.

Kendrick Frazier, editor of the SKEPTICAL INQUIRER, has been following climate issues as a science writer and editor for more than four decades.

Virginia Psychic Sues in Federal Court

BENJAMIN RADFORD

In early December, a Virginia psychic appeared in federal court to challenge what she claims is a violation of her First Amendment rights. Patricia King, who runs a fortune-telling business under the name "Psychic Sophie" in Chesterfield County's Chesterfield Town Center, argued that the county

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zoning and licensing regulations violate her constitutional rights to free exercise of religion, speech, and equal protection.

There is some precedent for upholding challenges to fortune-telling laws on the basis of free speech. Earlier in 2012, a federal judge in Louisiana overturned a law banning fortune-telling on the basis that it is protected by the First Amendment. U.S. District Judge Dee Drell struck down an ordinance outlawing fortune-telling, astrology, and palm reading on the grounds that the practices are fraudulent and inherently deceptive.

Even though there is no evidence that psychics give their clients valid information, they cannot be legally prohibited from operating a business. If a doctor, lawyer, or investment banker gives false information to his or her clients, they can be sued or charged with malpractice or fraud. In order to avoid problems with the law for giving false and misleading information to clients, many psychics claim that their services are "for entertainment only."

However, King's case is different. Lawyers for the city point out that King is not prohibited from operating as a psychic. The issue is not King's free speech but instead where she chose to open her business. City zoning and licensing ordinances do not allow fortune-telling in strip malls and professional office complexes, but it is permitted elsewhere in the area. The First Amendment does not guarantee people the right to operate businesses anywhere they wish regardless of local zoning laws. For example, an adult video store or liquor store cannot necessarily open right next to a school or a church.

Three judges on the Fourth U.S. Circuit Court of Appeals in Richmond began hearing the case on December 4, and the case continues as of this writing. This is not King's first time in court; U.S. District Judge John Gibney previously ruled against her, stating that the city's business zoning regulations were reasonable and that King's fortune-telling business was "deceptive."

Benjamin Radford is the deputy editor of the Skeptical Inquirer.

James W. Moseley (1931–2012)

Robert Sheaffer

The well-known UFO satirist, hoaxer, and occasional serious investigator James W. Moseley died of cancer in Key West, Florida, on November 16, 2012, at the age of eighty-one. A "skeptical believer" and noted "trickster" figure, his career in UFOlogy spanned sixty years. He attended Princeton University but did not graduate. Having inherited sufficient money to be able to pursue his own interests, Moseley did not have a conventional career. He spent much of his time traveling to UFO conferences, interviewing UFO witnesses and personalities.

In late 1953, Moseley began a great odyssey "tracking the elusive flying saucer." He drove from his home in New Jersey to the Pentagon to see the saucer cases that the Air Force had investigated. To his astonishment, he was allowed to do so, finding no cover-up. He interviewed the famous saucer author Major Donald E. Keyhoe, and "I wasn't impressed. I felt—correctly, I still believe—that Keyhoe routinely made too much out of too little, at least in part just to sell books." From there it was on to interviews in South Carolina and Georgia, then west to Mississippi, Texas, Arizona, and finally Mt. Palomar, California, where "Professor Adamski was holding court" in his hamburger stand. George Adamski was famous as the man who first made contact with the Venusians, and he had a sizeable, uncritical following. (Amazingly, he still does; Adamski's current followers held an anniversary gathering on that same spot, coincidentally on the very day after Moseley's death.) Moseley was not impressed by Adamski, and he riled some saucer believers by debunking Adamski's claims.

He drove on to Hollywood where he interviewed best-selling author Frank Scully, who vigorously defended the Aztec, New Mexico, "crashed saucer" story given him by Silas Newton and Leo Gebauer. On the way back Moseley interviewed Newton in Denver. Moseley wasn't impressed by Scully or Newton either. He contacted the office of former President Truman in Independence, Missouri, asking for an interview about flying saucers. Amazingly, even though this was just over a year after the famous and controversial 1952 "flying saucer invasion" of Washington, D.C., while Truman was still president, Moseley's request was granted. Truman took Moseley into his private office, where the former president joked around with him a bit, then told him that he'd never seen a saucer and didn't know anything about them.

In late 1953, Moseley began a great odyssey "tracking the elusive flying saucer."

In the decades that followed, Moseley became close friends with another UFOlogical "trickster" figure, Gray Barker (1925–1984), who was instrumental in launching the now-classic legends of the Men in

(Continued on page 15)

Bigfoot DNA Study: Making an End Run Around Science

A Texas veterinarian and other forensic specialists publish a study that purportedly shows novel DNA sequences that they conclude are evidence of Sasquatch. But the drama surrounding the paper is just the latest in a long series of events surrounding the Ketchum Bigfoot DNA project.

SHARON HILL

Is this the news Bigfooters have been waiting decades for? Or will it all end up a bust? A convoluted and controversial story of Bigfoot DNA evidence came to a head on February 13, 2013, when a long-promised paper by veterinarian Dr. Melba S. Ketchum was finally released.

The study, titled "Novel North American Hominins, Next Generation Sequencing of Three Whole Genomes and Associated Studies," was published in the inaugural issue of *DeNovo: Journal of Science*. The press release for the publication states that, with ten coauthors, Ketchum analyzed DNA from 111 high-quality samples submitted from across North America.

Melba S. Ketchum

The publication of the study was preceded by another press release months before announcing the conclusions. DNA Diagnostics, a veterinary laboratory headed by Ketchum, had issued a press release on November 24, 2012, that intrigued cryptozoologists and was covered by the mainstream media, some of it featuring skepticism provided by SI's Benjamin Radford. It said in part:

> A team of scientists can verify that their 5-year long DNA study, currently under peer-review, confirms the existence of a novel hominin hybrid species, commonly called "Bigfoot" or "Sasquatch," living in North America. Researchers' extensive DNA sequencing suggests that the legendary Sasquatch is a human relative that arose approximately 15,000 years ago as a hybrid cross of modern *Homo sapiens* with an unknown primate species.

The statement noted that twenty whole mitochondrial genomes were sequenced and three whole nuclear genomes were obtained from samples purported to be from Sasquatch. Ketchum and coauthors concluded that Sasquatch mitochondrial DNA (inherited from the mother) is identical to modern *Homo sapiens*, but Sasquatch nuclear DNA is "a novel, unknown hominin related to *Homo sapiens* and other primate species," making Sasquatch a hybrid species—"the result of males of an unknown hominin species crossing with female *Homo sapiens*."

Science by press release is undoubtedly bad form. Unfortunately, the November news was not accompanied by the paper or any other data to support its incredible claims. Ketchum, a graduate of the Texas A&M veterinary program, stated that the paper was forthcoming—as she had been stating for well over a year prior.

The Ketchum study began back in 2008, when her lab was picked to analyze an alleged Bigfoot/Yeti hair from Bhutan collected as part of Josh Gates's adventure show, *Destination Truth*. She then connected with several individuals and entered partnerships that provided her with suspected Bigfoot samples to test and funding for the project. Ketchum had filed a copyright notice in September 2010 for a media project that would describe "a new tribe of living humans." The theme of a proposed book and video was to be "Sasquatch as a modern human with some genetic mutations accounting for their physical appearance." This copyright notice foreshadowed the DNA study results.

The actual paper detailing the study

and results was supposedly submitted to an undisclosed journal in late 2010 or early 2011. Since peer review takes several months, Ketchum kept enthusiasm alive for those who followed her progress by providing teasers and assurances on social media: "Our data is amazing and beautiful and all cutting edge" (posted to her Facebook page in February 2012).

Ketchum's business, DNA Diagnostics (also doing business as Shelterwood Laboratory), appeared to be having difficulties. Ketchum had been party to a suit for patent infringement that required her lab to stop using certain tests (*OptiGen vs. Texas A&M, Shelterwood, Ketchum, et al.*). DNA Diagnostics was not in good standing with the Better Business Bureau, having received an "F" rating due to complaints. Issues regarding taxes and lost contracts were also rumored. In October 2012, the building that housed the lab in Timpson, Texas, was observed to be closed and advertised for rent, and the business's phone line was disconnected.

Ketchum failed to appear in person at two Bigfoot-themed conferences at which she was scheduled to speak (one in October 2011 and another in May 2012). She mentioned that she felt threatened and was shocked at the negative response she had received from some members of the Bigfoot research community who had grown impatient with continual promises of evidence. Some began to accuse her of perpetrating a hoax.

In a curious disclosure to her followers, Ketchum declared that she had actually seen the Bigfoot creatures herself and observed that they were "peaceful and gentle." In April of 2012, she made public a photo of an array of sticks in the forest that she said she took with her mobile phone, suggesting that it was made by the creatures. The picture of "blurry sticks" did not go over well with the Bigfoot community, as many supporters abandoned hope for the legitimacy of Ketchum's scientific work.

In a curious disclosure to her followers, Ketchum declared that she had actually seen the Bigfoot creatures herself and observed that they were "peaceful and gentle."

A still of a supposed Bigfoot from Adrian Erikson's YouTube video.

Nondisclosure agreements had been signed among participants of the Ketchum DNA project so that information would not be leaked prior to the reveal. But that did not stop Igor Burtsev, the self-appointed head of the Russia-based International Center of Hominology, from issuing the following "urgent" announcement on his Facebook page on November 23: "The DNA analysis of the Bigfoot/Sasquatch specimen conducted by Dr. Melba Ketchum the head of DNA Diagnostics, Timpson, TX, USA has been [sic] over!" Ketchum acknowledged this leak of the study as "unfortunate." A day later, she issued the official press statement without supporting documentation.

Following the release, she appeared in a few interviews. In one, she disclosed that high-definition video would accompany the release of the DNA data in conjunction with a project run by Adrian Erickson who supposedly collected DNA and video evidence of the creatures. Further sensationalism of the story occurred as reporters keyed into the claim that Ketchum had characterized the "unknown novel DNA" as "angel DNA." Ketchum denied ever using that term.

On December 6, 2012, Burtsev, who promotes the existence of the Yeti in Siberia, stated, again via Facebook, that the paper had been rejected by U.S. journals. He was harsh toward what he considers the closed-minded

American scientific establishment and claimed that they rejected the paper only on the grounds that it was associated with Bigfoot. He hinted that the paper may appear in a Russian journal. Response from the Ketchum camp via her spokesperson continued their stand that the paper was in peer review and "very scientific."

When the paper appeared in an unknown, brand-new journal, allegations of self-publishing arose. Where did this new journal come from? Its origins are highly suspicious. Ketchum says that an (unnamed) journal had accepted the paper after peer review was completed, but the journal's lawyers advised them *not* to publish due to the disreputable topic. Ketchum then stated on a website for the study, Sasquatch Genome Project, that she acquired the rights to this unnamed journal and renamed it *DeNovo*. Her excuse for this unconventional turn was that she did not want to wait any longer. "We encountered the worst scientific bias in the peer review process in recent history," she said, calling it the "Galileo Effect" and suggesting she was treated unfairly. At the same time, Ketchum also launched her own website called the Melba Ketchum Global Sasquatch Foundation on which was stated "Due to the efforts of our founder Dr. Melba Ketchum it has been proven that the Sasquatch are a human hybrid. Here at G.S.F. we have made it a priority to protect these indigenous people from being hunted, harassed, or even killed." This website was inaccessible by the evening of the paper's release.

The *DeNovo* website and its related sites were notably poor—amateurishly designed, hosted on free, low-volume servers, and riddled with errors (typographical and coding). The *DeNovo* site stated "open access" but accessing the Ketchum paper, the only one in the journal, costs thirty dollars. Ketchum made the paper available to some Bigfoot web bloggers but not to other scientists or science writers. Accompanying the paid or complimentary version of the paper was Erickson's video supposedly of a sleeping Sasquatch. The short clip, made public shortly after, showed a brown, furry mass apparently sleeping on a woodland floor.

Two days later, Ketchum announced through social media that "top level scientists that have volunteered" were assessing her data. Meanwhile, the few experienced geneticists who viewed the paper reported a dismal opinion of it, noting it made little sense. Three of the references used in the paper were discovered by careful readers to be questionable in validity, and one was an openly stated April Fools prank. Ketchum conceded she was told to include all references, but she did not concede that she knew they were not serious scientific works.

Ketchum attempted scientific credibility through the process of peer review. She had never been a lead author on any paper much less one that makes such an extraordinary claim. The paper's poor editing and presentation fueled speculation that the paper itself was a joke.

Unanswered questions loom large regarding the source of these suspected Sasquatch DNA samples, how they were collected, how they were analyzed, and the justification for the conclusion that the DNA is attributable to Bigfoot/Sasquatch. Some critics have stated that the DNA may have been contaminated. Ketchum assured her audience on the *Coast to Coast AM* radio show of December 23, 2012, that she fully accounted for contamination issues. The initial quick matching by reviewers with access to a genetic database showed correlations to human and other various animals in parts, but much of the material was not a match with anything (the "unidentified" DNA). What does the Ketchum study show? It's not yet clear.

Ketchum attempted scientific credibility through the process of peer review. She had never been a lead author on any paper much less one that makes such an extraordinary claim. The paper's poor editing and presentation fueled speculation that the paper itself was a joke. She attempted to court favor with the Bigfoot hunter crowd as its potential savior who will herald in a new era of respectability with scientific "proof." Instead, the project played out in a way that eroded support from both circles. Her associates did not help the cause and often provided fodder to discredit her. Her missteps and disclosures about her own personal beliefs sabotaged her reputation.

Professional critique of the paper is likely forthcoming, and additional allegations of chicanery arise daily. Regardless of the drama surrounding this project, it is clear that this set of highly questionable results will not serve to be indisputable "proof" of Bigfoot as believers had so hoped. ■

Sharon Hill is a CSI Technical Consultant and editor of the Doubtful News website.

James W. Moseley *(Continued from page 11)*

Black and Mothman. As might be imagined, when they got together they were frequently up to mischief. Moseley admitted to at least one hoax (there were obviously more)—the famous Straith Letter to Adamski. Barker and Moseley forged an authentic-looking letter from the U.S. Department of State, purporting to be from a nonexistent person named R.E. Straith, telling Adamski that the U.S. government knew that his claims of meeting Venusians were true.

Having begun publishing *Saucer News* in 1954, Moseley sold it to Gray Barker in 1968. Moseley then began publishing *Saucer Cruise*, *Saucer Booze*, and *Saucer Jews* (dedicated to his longtime friend Gene Steinberg). Finally, he settled on *Saucer Smear*, "Dedicated to the highest principles of UFOlogical journalism." It became the longest continuously published UFO publication in the world. When UFOlogists were feuding (as they quite often were), Moseley loved to run the vitriolic letters one would send in denouncing the other. He was the longtime chairman of the National UFO Conference and attended most of them. He gave many lectures about flying saucers and even made several trips to Giant Rock in the California desert, a sort of Woodstock for UFO contactees and their followers.

In 2002, Moseley coauthored, with the late Karl Pflock, *Shockingly Close to the Truth—Confessions of a Grave-Robbing UFOlogist* (Prometheus Books).

Moseley had doubts about many "classic" cases, including the Roswell crash and the case he always called "Rendle-SHAM." The irascible John Keel once castigated him, "You are a boil on the ass of UFOlogy." Moseley proudly placed this tribute at the top of numerous issues of *Saucer Smear*. I first met Moseley at a Fortean convention in Washington, D.C., in the late 1970s. He visited me several times in California, and we met many times at various conferences. We remained in frequent contact until his death.

Moseley was among the last survivors of the very beginning of the saucer era, to whom Arnold's sighting and the Mantell crash were not historical events but personal memories. He also belonged to the age of the typewriter and never used a computer. Until his death each issue of *Saucer Smear* consisted of eight pages of typed text, interspersed with some humorous cartoons, news headlines, or offbeat photos. He relied on others to provide him with material from what he always called "the cursed Internet."

Robert Sheaffer has written SI's "Psychic Vibrations" column for over thirty years. He blogs at BadUFOs.com.

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Joe Nickell, PhD, is CSI's senior research fellow and author of such books as *Inquest on the Shroud of Turin, Relics of the Christ*, and *Looking for a Miracle*.

Scotland Mysteries–Part II: Ghosts, Fairies, and Witches

Joe Nickell continues his investigation of Scottish enigmas—based in part on his excursion following the 2012 skeptics QED conference in England, with intrepid skeptical investigator Hayley Stevens and her father Andy, who is a photographer and professional guide. Part I (SI March/April 2013) tracked "The Silly Ness Monster" from lore to shore. Part II investigates the hauntings of Sterling Castle and the Royal airfield at Montrose, as well as the strange case of "A Fairy-Taught Witch."

Green Ghost of Stirling Castle

Atop a great volcanic crag that is believed to have been fortified since ancient times, Stirling Castle was rebuilt again and again. Its first mention is in the eleventh-century *Life of St. Monenna*. From 1296, it was often occupied by the English, but then it returned to Scottish control after a six-month siege in 1342. Much of the castle as seen today was created by James IV as a magnificent residence and setting for his royal court (Yeoman 2011, 36–48). (See Figure 1.)

Various colorful legends of the castle survive. In the fifteenth century, an English chronicler named William of Worcester identified the site as the home of King Arthur and his Knights of the Round Table—a myth repeated by subsequent writers. A more down-to-earth (quite literally) story tells of an Italian-born alchemist, John Damiano, who in 1507 attempted to impress his patron, the king, by engaging in man-powered flight from the castle walls! Unfortunately, his strapped-on wings failed the brave birdman, who plummeted to earth yet survived by landing in the royal rubbish heap (Yeoman 2011, 38, 48–49). Today's popular Stirling Castle legend is that of a ghostly lady in green.

A more down-to-earth (quite literally) story tells of an Italian-born alchemist, John Damiano, who in 1507 attempted to impress his patron, the king, by engaging in man-powered flight from the castle walls!

The Green Lady is generally acknowledged to be "Stirling's most famous ghost" ("Scottish" 2012). "Some say" (reports Kinnaird 2009, 38) "she was a poor lass, driven to despair—separated from her love, trapped, starving within the castle walls during King Edward's siege of that great fortress." Yet another version posits that "the Green Lady was the daughter of a governor of the castle who was betrothed to an officer garrisoned there." Supposedly, "The poor man was accidentally killed by the girl's father and she in despair and anguish is said to have thrown herself from the battlements to her death on the rocks 250 feet below" ("Stirling" 2012).

Others tell a very different tale. They claim the Green Lady was a maidservant to Mary Queen of Scots. According to a popular legend, she saved the queen after her four-poster bed's curtains caught fire. Versions of the tale disagree as to the maidservant's fate at this point, one having her somehow dying in making the rescue ("Scottish" 2012), while another says the door was broken open "and anxious arms strained to carry them both to safety" (Kinnaird 2009, 38). Yet another source, however, observes of the rescue that "history has failed to record whether or not she perished as she did so" (Love 1995, 22). Attempting to harmonize the discrepancy, Kinnaird

(2009, 39) ventures, "of the girl little is known, though it is feared that she quickly perished from the wounds she received that fateful night." (Remove the word *feared* from the preceding and it is easy to see how speculation could be transformed to alleged fact in the retelling of a tale.)

Lack of historical record has not prevented still more elaborate versions of the tale from proliferating. For instance, the maidservant is sometimes alleged to have been alerted to the fire by a dream of the queen being in danger; on being rescued, the queen purportedly "recalled a prophecy that her life would be endangered by a fire whilst she was at Stirling Castle" ("Stirling" 2012)—although no source is given. Folklorists call differing versions of folktales "variants"; they are evidence of the folkloric process at work.

Apparently by extension from this legendary event, the apparition is said to be "most commonly encountered before some major disaster" (Love 1995, 22). This is a folk motif (or narrative element)—ghost warns the living—that is common to the folklore of England and Scotland (Thompson 1955, 2:435).

Further evidence of the Green Lady's folkloric origins comes from the fact that "Scotland seems to be the home of the green-colored ghost, in particular the 'Green Lady.'" Indeed, while "Accounts of blue, white, and grey ghosts are noted throughout the world," those of the green variety are few, even in neighboring England, according to Dane Love. She devotes the entire first chapter of her *Scottish Ghosts* to these numerous apparitions, stating, "Tales of the Green Ladies haunting ancient castles are told the length of the country, from Dumfriesshire's Comlongon Castle in the south to the Castle of Mey on the northern extremity of the mainland" (Love 1995, 17).

In his cultural history of ghosts, R.C. Finucane (1984) demonstrates that as people's expectations concerning the dead change with time and place, so do their perceived specters. The profound iconographic peculiarity of green as the dominant color of Scottish ghosts is telling: it suggests that a supernatural basis is unlikely and is instead quite attributable to Scottish lore.

None of this is to suggest that people have never "seen" the Green Lady—or at least a "misty green figure" such as described by a cook in the officers' mess (an army garrison was located at the castle). But the condition under which the phantom was perceived—while the percipient was engaged in routine activity ("Stirling" 2012)—is revealing, since apparitional experiences are often linked to such periods of reverie. In this dissociative state, the subconscious may yield up a spectral image that thus seems momentarily superimposed on the visual scene (Nickell 2012, 345).

Photo by Joe Nickell

Figure 1. Scotland's ancient Stirling Castle, crowning a massive volcanic crag, is allegedly haunted by "The Green Lady."

Haunted Airfield

Known as "the phantoms of Montrose," ghosts allegedly haunt the Royal Air Force (RAF) airfield at Montrose, Scotland. A variety of phenomena have been attributed to them, especially to one pilot who perished on a solo flight at Montrose on May 27, 1913.

The pilot was Lieutenant Desmond L. Arthur, an Irishman, whose biplane plummeted after a wing broke off. By 1916, sightings of the phantom aircraft and a ghost presumed to be that of Lt. Arthur haunted the RAF station. Unfortunately, popular stories of "the haunted airfield" (Cohen 1984; Caidin 1996) are long on sensationalism and mystery but short on evidence and documentation. Much of what is alleged seems attributable to the dynamics of folklore, the power of suggestion, and misperceptions of various types. For instance, a 1916 sighting of a ghostly figure in flight gear occurred just after a sleeping flight instructor "came awake with a start" (Caidin 1996, 35). Under such conditions, the likely explanation for the apparition is a common type of hallucination: known as a "waking dream," it occurs in the twilight between being fully asleep and fully awake (Nickell 1995, 290; Nickell 2012, 353–354).

Supposedly, the ghost of Lt. Arthur flew on each airman's first solo night flight at Montrose. Often, those making such flights felt a distinct tap on the shoulder, and some even claimed the ghost remarked, "O.K., son, I'll take control."

I heard this tale from former RAF Sgt. Pilot Clay Bird, an acquaintance

of mine in Toronto, Canada, in the mid-1970s. Bird related to me his own spooky experience at Montrose. It was February 1942, and he was then making his first solo night flight. He was of course apprehensive—ghost or no. Flying a single engine two-seat trainer, he prepared for landing by sliding back the "hood" or canopy. (This was standard procedure so that in the event of a crash, rescue would be speedier. When an instructor occupied the rear seat, he slid his hood forward, the two sections then overlapping over a central, stationary section. The cockpit would thus be open front and rear. On solo flights, however, only the front section would be pushed back.)

Sgt. Bird began to concentrate on the approach. Suddenly he felt—really felt—a tap, tap, tap! The taps were then repeated, "as if he [the ghost] were getting impatient," Bird remarked.

Understandably unnerved, he turned and actually saw the "ghost": It was part of the adjusting strap! An eight-inch section of harness, extending from the point of buckling, was flapping in the breeze and hitting against his shoulder!

"I don't scare easily," Bird said, "but I'll tell you I didn't fly again that night!"

A Fairy-Taught Witch

In my travels in Scotland, I picked up a book, *Scottish Witches*, which devotes several pages to Isobel Gowdie. Of the witch hunts of the sixteenth- and seventeenth-centuries, when untold numbers from Scottish towns were burned at the stake, Gowdie's case stands out, both for the voluntary nature of her confession (made in four parts over a six-week period in 1662) and for the rich amount of information it offered (Seafield 2009, 116–22). (For the complete text, see Wilby 2011, 37–52.)

Gowdie, of Auldearn, detailed how she and a dozen other witches had flown to sabbats riding on rushes and corn straws (charming them into flight with an invocation of the Devil). Gowdie also went on rides to fairyland and claimed that she had been taught much of her witchcraft by fairies (Guiley 1989, 142).

Sexual activity was central to the witches' coven. At the sabbats Gowdie claimed to have intercourse with the well-endowed Devil and with various demons. She even copulated with one demon lover while she lay in her own bed, she maintained, with her husband asleep beside her.

She and other witches, Gowdie stated, raised storms by reciting incantations while beating a wet rag on a rock. In confession number two (recorded in an antique English script called Secretary Hand, penned by a notary) she explains:

> Quhen we rease the wind we tak a rag of cloth and weitis it in water and we tak a beetle and knokis the rage on a stone, and we say thryse ower I knok this ragg upon this stone, to raise the wind in the divellis name, it sall not lye untill I please again *(damaged—words missing)* we wold lay the wind, we dry the ragg and say (thryse ower) we lay the wind in the divellis nam *(damaged—words missing)* ryse q[uhi]ll we or I lyk *(word crossed out)* to rease it again, And if the wind will not lye instantlie *(damaged—words missing)* wee call upon o[u]r spiritis and say to him thieffe thieffe conjure the wind and caws it to *(damaged—words missing)* we haw no power of rain bot ve will rease the wind q[uhe] n ve please, he maid us believ *(damaged—words missing)* th[e]r wes no god besyd him . . .

(Quoted in Wilby 2011, 43).

In addition, Gowdie said, the witches hexed children (by inflicting injuries on clay dolls), damaged a farmer's crops (by unearthing an unchristened child's corpse and burying it in the farmer's manure heap), and so on (Guiley 1989, 142). When they became bored, the witches metamorphosed into animals. (For example, to turn into a cat, Gowdie recited three times: "I shall go into a cat, / With sorrow and sign and a black shot / And I shall go in the Devil's name / Ay while I come home again" [Cawthorne 2006, 129–30].)

Sexual activity was central to the witches' coven. At the sabbats Gowdie claimed to have intercourse with the well-endowed Devil and with various demons. She even copulated with one demon lover while she lay in her own bed, she maintained, with her husband asleep beside her (Wilson 1971, 419). The basic elements of Gowdie's account were supported by another witch, Janet Braidhead. Together they implicated more than thirty others in their confessions. There is no existing record of any of these people's fate, but it is widely assumed that Gowdie and Braidhead, at least, were put to death (Seafield 2009, 117).

Now researchers have wondered how to explain Gowdie's claims. Montague Summers, a believer in true magic, thought her account "substantially true" and only lamented being unable to identify the leader of the coven! (Robbins 1959, 232). Somewhat similarly, skeptic Owen Rachleff (1971, 105–117) suggested that the Devil was actually the coven leader in costume, complete with "cloven-shaped boots," that drugs induced the "flying" sensation, and so on. At the other end of the spectrum, some have suggested that Gowdie may simply have lapsed into madness (Seafield 2009, 120), what Walter Scott (1857, 281–2) termed "some peculiar species of lunacy."

I think these views, however, represent the same false dichotomy—a choice between believing the experi-

ences true (or at least staged) or thinking the claimant is mad—that is often posed in the matter of alien abductions. As we now know, most self-claimed abductees are sane and normal but have traits indicative of fantasy-proneness, coupled with magical thinking and common hallucinations (Nickell 2007, 251–58).

The magical thinking engaged in by Gowdie and others is ubiquitous. It can be no coincidence that the hexes and spells practiced by the "witches" were simply those common to Scottish lore. (Hitting a wet rag against a stone to conjure up a storm is only one example of sympathetic magic. The voodoo-like use of dolls as substitutes for people is another.) That witches like Gowdie believed them effectual is hardly proof that they were actually so. Instead, it suggests they counted (or reinterpreted) any seeming successes, while rationalizing away any failures. This is the effect of what is called confirmation bias.

As to Gowdie's demonic sex encounters, these may have been only fantasies stemming from sexual repression: Gowdie was apparently the bored, childless wife of a boorish farmer (Cavendish 1970, 1143). Indeed, her description of sex with a demon in her own bed sounds like earlier reports of visits by incubi (medieval demons who came at night to copulate with women). Today we understand that the incubus is a product of the imagination, akin to such other night visitors as ghosts, angels, vampires, and aliens who appear in "waking dreams." As discussed earlier, these are simple hallucinations that occur in the interface between sleep and wakefulness and seem particularly vivid and realistic (Nickell 2007, 254–55).

Similarly, the witches' reports of "flying" may have been due to out-of-body experiences (OBEs). Also called astral travel, this phenomenon of seemingly leaving the body and floating or flying is another hallucinatory type of experience (Nickell 2007, 254). Often one "seems to be able to travel to, and perceive, distant locations on Earth or in nonworldly realms" (Guiley 1991, 419)—hence, no doubt, Gowdie's trip to fairyland. (OBEs are still often reported, with one-fourth of Western adults believing they have had such an experience. It can occur when one is awake or sleeping and under certain conditions, such as stress [Guiley 1991, 420].)

The magical thinking engaged in by Gowdie and others is ubiquitous. It can be no coincidence that the hexes and spells practiced by the "witches" were simply those common to Scottish lore.

Significantly, magical thinking, waking dreams, and out-of-body experiences are all associated with the fantasy-prone personality, as Wilson and Barber (1983) make clear in their classic study. So is the tendency to have imaginary companions, such as an invisible friend, guardian angel, alien communicant, or the like; Gowdie said each of the witches "has a Spirit to wait upon us, when we please to call upon him" (qtd. in Cavendish 1970, 1144).

No one in Gowdie's time knew what to make of her reported experiences—apparently including her. Even today many people still engage in magical thinking and believing in supernatural powers, including witchcraft. Fortunately, others of us look instead to science and reason, seeking to learn about the real, natural world in which we actually live. ■

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[THINKING ABOUT SCIENCE MASSIMO PIGLIUCCI

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Whose Burden of Proof?

Discussions of science and pseudoscience often come down to a question of burden of proof. However, contrary to popular belief—even among skeptics—it is not always a straightforward matter to establish where the burden lies. For instance, it is common to hear phrases such as "Well, you are making a positive claim, so the burden is clearly on you." Not so fast, buster. Logically speaking, to claim P is exactly the same as to deny not-P, which means that it is a simple sophistic move to turn a positive claim into a negative one and vice versa.

Turns out that there is significant philosophical (and legal!) literature on the concept of burden of proof, and it would behoove skeptics to be acquainted with at least some of it. To begin, the proper allocation of burden of proof very much depends on accepted background knowledge. Consider the early version of the Darwinian theory of evolution: at the time the accepted way of looking at biological diversity was in terms of natural theology, so Darwin had to work hard to preempt a number of possible objections to his theory, objections that—although they came from a standpoint that today we would identify as Intelligent Design "theory"—were perfectly reasonable at the time. But times have changed, the general outlines of the theory of evolution are now widely accepted (among scientists), so it is the ID supporter who bears much of the burden for proving his case.

Another interesting thing to appreciate about burden of proof is that it is actually related to a number of so-called "informal" logical fallacies, which—under some circumstances—turn out not to be so fallacious after all.

A good way to think about a fair distribution of the burden of proof is to adopt a Bayesian framework. As is well known, Bayes's theorem states that the probability of a theory being true given certain observations (P[T|O]), known as the posterior probability, is proportional to the probability of the theory being true given current background information (P[T]), known as the prior probability, multiplied by the probability of observing O if T were in fact correct (P[O|T]).

So, for instance, the reason we require a high standard of proof in order to accept the theory T that UFOs are visiting spaceships is because P[T] is very low given currently accepted notions of physics and engineering. But after we discover warp drive, say, we may find that our priors went significantly up, so that the acceptability of T given available observations has also gone up (though by how much will still depend on the quality of the observational reports). As always, in a Bayesian framework we want to stay clear of the two extremes: if we set our priors to 0 (total skepticism) or 1 (faith), then no amount of evidence will ever move us from our position, so the latter cannot then be described as reasonable at all.

Another interesting thing to appreciate about burden of proof is that it is actually related to a number of so-called "informal" logical fallacies, which—under some circumstances—turn out not to be so fallacious after all. The three informal fallacies most closely related to the idea of burden of proof are the ad hominem (attack "on the man"), the petitio principii (circular reasoning), and the argumentum ad ignorantiam (argument from ignorance). I only have space to explore the last example, so we will have to leave the other two for another occasion (or, as they say, as an exercise for the readers!).

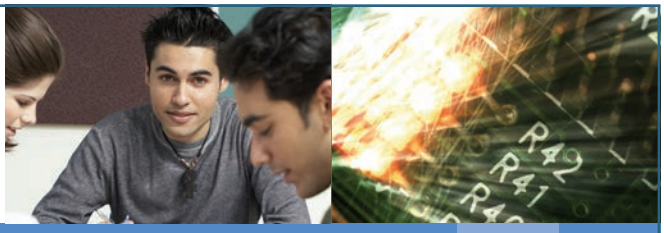
An argument from ignorance—although usually dismissed out of hand by skeptics—is actually not necessarily fallacious (though it certainly can be!).

Indeed, the difference between a fallacious and a reasonable version lies in the placement of the burden of proof. For instance, suppose we are discussing the theory behind acupuncture. It invokes a novel form of energy, qi, which flows through specific life-energy paths known as "meridians." A skeptic can (reasonably) argue that modern science has not discovered anything that fits into the concepts of qi and meridians, to which the believer could reply with a charge of ad ignorantiam, along the lines of "there is no reason in principle why qi couldn't one day be accepted into standard physics." But the skeptic's argument is reasonable: while one cannot categorically exclude the existence of qi and meridians, modern science is advanced enough that the burden of proof is on the believer to explain why this new form of energy has not yet been discovered, as well as how it would fit into the tightly knit logic of contemporary fundamental physics.

Conversely, however, a charge of ad ignorantiam sticks when it is made by a skeptic of the above-mentioned Intelligent Design "theory" in response to the oft-heard claim that "one cannot see how Darwinian evolution could explain X." What's the difference with the previous case? It is that the accepted scientific background theory is Darwinian evolution, so the burden of proof squarely lies on the shoulders of the proponent of ID (as opposed to the case of qi energy and meridians, which are not accepted background but rather the very thing for which evidence is required in the discussion at hand). So when deploying (or deflecting) a charge of ad ignorantiam one is really defending or shifting a particular conception of the burden of proof, as it applies to the issue being debated.

One more contribution from philosophy concerning the burden of proof. It, like pretty much anything else we discuss, is an example of what Wittgenstein famously called a "language game." The idea is that people need a shared language to engage in a meaningful discussion, i.e., to play the same (semantic) game. Wittgenstein wasn't making the trivial point that people better be speaking the same natural language (e.g., English or Italian), on penalty of literally not understanding each other. The idea was that to "play" a certain language "game" we need to agree on the background rules and conditions. In our case, this means that skeptics and proponents of a given controversial notion have to agree on what counts as rules of evidence, accepted background scientific knowledge, and so on. If they don't—as is in fact often the case when skeptics debate young-Earth creationists—then the problem isn't one of logic or burden of proof but a much more fundamental one of speaking a "private" language that your interlocutor does not understand. It is a major challenge for scientific skepticism to get people to simply accept the rules of the game before they can even begin to play. ■

SCIENCE AND THE PUBLIC



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The Thought Reader Craze

On Friday, May 23, 1884, a very peculiar meeting was organized by famous British journalist and spiritualist W.T. Stead at the offices of his *Pall Mall Gazette* (PMG) in London. The idea was to offer the chance to observe up-close the marvelous mental powers of a handsome, dark-eyed, twenty-seven-year-old named Stuart Charles Francis Cumberland to thirty prominent representatives of Victorian culture.

It was not entertainment; instead—laying the foundation for what would happen ninety years later in the offices of *Time* magazine, where handsome, dark-eyed, twenty-eight-year-old Uri Geller was invited to perform in front of a few experts, including an undercover James Randi—it was a challenge. The challenge of considering a redefinition of the limits of the mind of man.

There were no magicians among the thirty lucky guests; British master John Nevil Maskelyne had been invited but, regretfully, could not attend.

Since June 1880, Cumberland had been publicly demonstrating that he could read the serial number of a banknote sealed in an opaque envelope; that he could detect and reproduce a "crime" imagined and acted on while he was out of the room and, though securely blindfolded upon his return, identify the victim, the weapon, and the criminal within only a few minutes; and, finally, that he could accurately reproduce an arbitrary design drawn out of his view. It appeared that he could discern unspoken thoughts whether he actually touched the subject or was connected to him or her by only a handkerchief.

Famous American thought reader Washington Irving Bishop in full evening dress.

The witnesses of the meeting with Cumberland included occultist Colonel Henry Steele Olcott, cofounder of the Theosophical Society with Madame Helena Blavatsky, and two prominent skeptics, zoologist Edwin Ray Lankester and Dr. Horatio Donkin, who in 1876 had exposed the fraudulent trickery of spirit medium Henry Slade—an exposé that led to the prosecution of Slade where he was found guilty and sentenced to three months hard labor (which he was able to escape thanks to a technicality that allowed him to leave England before a new indictment could be prepared).

Writer and playwright Oscar Wilde was among those invited at the PMG demonstration. At the time, needing the money, Wilde was writing all the unsigned book reviews for the PMG (later, he would also review one of Cumberland's books). But how was it possible for a music-hall performer to ignite the interest of such intellectuals and bring them to the point of considering the possibility of the impossible? This is the theme of *The Thought Reader Craze*, aptly subtitled "Victorian Science at the Enchanted Boundary," the new book by prolific historian of magic and spiritualism Barry H. Wiley (www.macfarlandpub.com).

Beginning in 1870, the hunger for scientific discovery in Great Britain drove prominent scientists, philosophers, and others to promote the legitimacy of telepathy. At the same time, mind-reading as a form of entertainment gained increasing popularity as persuasive performers like John Randall Brown, Washington Irving Bishop, and Stuart Cumberland convinced reporters that they could truly read the thoughts of others. The widely publicized, sometimes bizarre, interactions between scientists and these charlatans ushered in the thought reader craze, a period that lasted through about 1910 and saw entertainers make and lose fortunes while scientists made and lost reputations.

Wiley's book explores this unusual cultural phenomenon, showing how it was aided through the years by pub-

lic scientific pronouncements, astonishing performances by the thought readers, and the rapidly changing industrial society. It also collects many rarely read anecdotes, like the PMG demonstration, where the first subject that Cumberland chose to work with was Wilde himself, who immediately refused. It was then up to Stead to participate. Cumberland was blindfolded with white silk and successfully found the object thought of—the pince-nez glasses of the London correspondent of the *Neue Freie Presse*.

Cumberland appeared to be a master of so-called "muscle reading." The term, coined by American pioneering physiologist George Miller Beard after observing one of the early performers of the art, J. Randall Brown, described a technique that relied on the assertion that a subject will subconsciously reveal his thoughts through very slight involuntary physical reactions, also known as ideomotor responses. Thus, an experienced performer could determine what the subject is thinking by recognizing and interpreting those responses.

Cumberland, in fact, pointed out after his successful demonstration with Stead that he "always desired his subject to think of the direction or route to the article rather than the article itself."

After some friendly banter, the blindfold was back in place and he found a pin in the fingers of American businessman Andrew Carnegie but failed to find a pin hidden by Lankester. "His concentration was insufficient," he declared (anticipating an often-heard excuse later borrowed by psychics whenever a test was performed under conditions not lax enough to permit cheating). He took the wrist of Oscar Wilde, who knew the location of the pin, and immediately went in a straight line to the lapel of another man.

For the final test, Cumberland had to find an object thought of by science writer Grant Allen, which was located outside the PMG offices. With Cumberland blindfolded and hatless (in case wearing a hat might interfere with the exercise), a procession ran out in the street following the mind reader who held the wrist of the journalist. People in North Cumberland Street watched in astonishment at the odd parade. Stopping at No. 17, Cumberland pounded on the door. When the servant opened and saw a blindfolded man followed by a crowd, he slammed it shut again.

Allen was not concentrating hard enough. When he did, Cumberland rushed to No. 6, pushed through the door, went up the stairs, straight to the drawer of a desk, paused, and then retreated to an ottoman by a window. The thought reader raised the lid of the ottoman and brought out the hidden object: a carefully preserved hunk of bread, eighteen years old, and a relic of a major PMG article written on the ugly and degrading conditions in work houses that had subsequently brought substantial reforms.

The successful demonstration made the front page of the *Gazette* and brought more publicity for Cumberland, who would shortly be called to perform at the House of Parliament with Prime Minister William Gladstone himself as one of the subjects and would later make the news claiming to have "dreamed" the identity of the notorious Jack the Ripper. He later retired as a rich man.

The exploits and stunts that characterized those crazy years, including the tests done by William Crookes, the Creery Sisters scam, and the Blackburn and Smith scandal, are well told by Wiley, who is also an associate of the exclusive Inner Magic Circle of London. Barry H. Wiley's *The Thought Reader Craze* reads like a thrilling adventure story. ■

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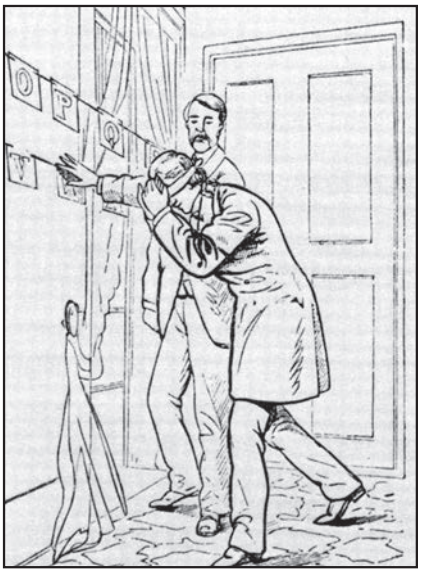
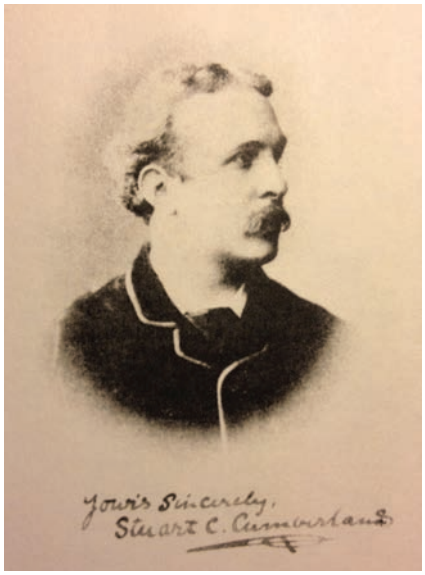


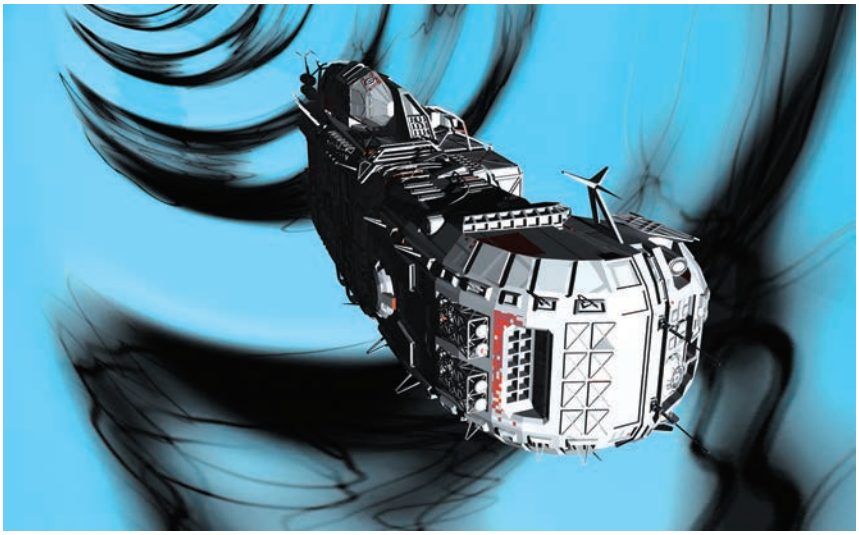
A drawing depicting J. Randall Brown during a test of thought reading.



A signed portrait of Stuart C. Cumberland in 1896.

Sheaffer's "Psychic Vibrations" column has appeared in the SKEPTICAL INQUIRER for more than thirty years; its highlights have now been published as a book (Create Space 2011). Sheaffer blogs at www.BadUFOs.com, and his website is www.debunker.com.

Is Interstellar Travel 'Preposterous'?



How plausible is the case for future interstellar travel? Stanton Friedman, the "Flying Saucer Physicist," is confident that interstellar travel is not only possible but likely. In his essay "UFO Propulsion Systems," Friedman writes,

> a one-way trip of thirty-seven years (the distance to Zeta 1 or 2 Reticuli) at 99.9 percent c would take only twenty months' crew time; at 99.99 percent c it would take only six months' crew time. Thus even a trip to a distant galaxy such as Andromeda, two million light-years away, would take under sixty years' crew time if the intergalactic ship somehow could manage to keep accelerating at one G, using some yet unknown technique.

Ah, that pesky little "yet unknown technique." Now this is all perfectly true, but it ignores some very fundamental problems that are independent of any level of technology. A trio of "classic" physics papers written in the 1960s, and now often overlooked, examined the fundamental physics involved in proposed interstellar travel and explained the formidable obstacles: obstacles imposed by fundamental laws of physics, not by limits of technology. These articles sufficed to convince the scientific community that the concept of interstellar travel is utterly implausible, and explanations for UFO sightings must be sought elsewhere—in psychology and sociology, not in physics.

1. Radioastronomy and Communication through Space by Edward M. Purcell. (U.S. Atomic Energy Commission Report BNL-658, reprinted in Cameron, A.G.W. (editor), *Interstellar Communication*. New York: W.A. Benjamin, Inc., 1963.) Purcell (1912–1997) taught physics at Harvard University and shared in the 1952 Nobel Prize for physics. He was a pioneer in radio astronomy, the first to detect the famous 21-cm radio emission line from neutral hydrogen in the galaxy. He also is credited with the discovery of Nuclear Magnetic Resonance.

Most of the paper is uncontroversial and explains then-recent discoveries in radio astronomy. But in the section titled "Space Travel," Purcell examines claims that someday we will travel to the stars at almost the speed of light. "The performance of a rocket depends almost entirely on the velocity with which the propellant is exhausted," he notes. Thus,

> the elementary laws of mechanics—in this case relativistic mechanics, but still the elementary laws of mechanics—inexorably impose a certain relation between the initial mass and the final mass of the rocket in the *ideal* case. . . . It follows very simply from conservation of momentum and energy, the mass-energy relation, and *nothing* else.
>
> For our vehicle we shall clearly want a propellant with a very high exhaust velocity. Putting all practical questions aside, I propose, in my first design, to use the ideal nuclear fusion propellant. . . . I am going to burn hydrogen to helium with 100 percent efficiency; by means unspecified I shall throw the helium out the back with kinetic energy, as seen from the rocket, equivalent to the entire mass change. You can't beat that, with fusion. One can easily work out the exhaust velocity; it is about 1/8 the velocity of light. The equation of Figure 13 tells us that to attain a speed 0.99 c we need an initial mass which is a little over a billion times the final mass.

A billion times the final mass? In fact, the exact figure is 1.6×10^9. So in the ideal case, where you had somehow mastered nuclear fusion with 100 percent efficiency and could control and direct the energy in whatever way you choose, you still will need 1.6 billion tons of fuel for each ton of payload!

Surely, such a rocket has never been built and never will be built in our solar system or any other. Thus, Purcell has demonstrated beyond any possibility of doubt that all proposals to reach near-light speed using nuclear fusion propulsion are complete absurdity.

But supposing some other, more energetic reaction could be found? Nuclear fission produces an even lower exhaust velocity than fusion, so it's less plausible still. Is there any reaction more energetic than nuclear fusion? "This is no place for timidity, so let us take the ultimate step and switch to the perfect matter-antimatter propellant. . . . The resulting energy leaves our rocket with an exhaust velocity of c or thereabouts. This makes the situation very much better. To get up to 99 percent the velocity of light only a ratio of 14 is needed between the initial mass and the final mass." That sounds very much better. If I can "somehow" procure sufficient antimatter, "somehow" store it, "somehow" control its reaction with matter, and "somehow" direct the resulting energy where I want it to go, I need only seven tons of matter and seven tons of antimatter for each ton of payload. That sounds almost possible. But Purcell points out that all that buys you is a one-way ticket out of the galaxy: you have no way to slow down and stop when you get where you want to go. Stopping when you reach your destination requires a fuel-to-payload ratio of 196. And if you want to someday return, unless you know of a convenient matter-antimatter fueling station at your destination, you will need to square that again, for a fuel-to-mass ratio of almost 40,000.

And even if you could "somehow" construct such a vehicle, your problems are not over yet. "If you are moving with 99 percent the velocity of light through our galaxy, which contains one hydrogen atom per cubic centimeter even in the 'empty spaces,' each of these hydrogen atoms looks to you like a 6-billion-volt proton, and they are coming at you with a current which is roughly equivalent to 300 cosmotrons per square meter. So you have a minor shielding problem to get over before you start working on the shielding problem connected with the rocket engine." Also, "In order to achieve the required acceleration our rocket, near the beginning of its journey will have to radiate about 10^{18} watts. This is a little more than the total power the earth receives from the sun. But this isn't sunshine, it's gamma rays. So the problem is not to shield the payload, the problem is to shield the earth."

"Well, this is preposterous, you are saying. That is exactly my point. It is preposterous. And remember, our conclusions are forced on us by the elementary laws of mechanics." Nothing else needs to be written about the possibility of relativistic travel: Purcell has shown it to be completely preposterous. However, Purcell concludes his paper by demonstrating that interstellar communication using radio waves is perfectly possible. His final words are, "All this stuff about traveling around the universe in space suits—except for local exploration, which I have not discussed—belongs back where it came from, on the cereal box."

Purcell has demonstrated beyond any possibility of doubt that all proposals to reach near-light speed using nuclear fusion propulsion are complete absurdity.

2. The General Limits of Space Travel by Sebastian von Hoerner (*Science* 137, 18, 1962; reprinted in Cameron 1963). Immediately following Purcell's paper in the Cameron volume is this related paper by von Hoerner (1919–2003), a German radio astronomer who was influential in early discussions and proposals for SETI. He examines the physical difficulties of propulsion for space travel, including possibilities not covered by Purcell. Von Hoerner considers ion thrust propulsion but concludes that "nuclear reactors and all the equipment needed to give a strong ion thrust are so complicated and massive, as compared with the relatively simple combustion equipment, that there is no hope at present of reaching, with reactors, the value of P [engine power to mass ratio] already attained with combustion rockets." He also considers proposals for a huge "scoop" or funnel for a rocket to fuel itself as it goes along, scooping up galactic hydrogen. But he notes that interstellar matter has very low density, and "in order to collect 1000 tons of matter (10 times the fuel of one Atlas rocket) on a trip to a goal 5.6 parsecs away, one would need a funnel 100 km in diameter; we will rule out this possibility."

After several pages of equations covering much the same ground as Purcell, von Hoerner concludes, "there is no way of avoiding these demands [for power], and definitely no hope of fulfilling them . . . space travel, even in the most distant future, will be confined completely to our own planetary system, and a similar conclusion will hold for any other civilization, no matter how advanced it may be. The only means of communication between different civilizations thus seems to be electro-magnetic signals."

3. Physics and Metaphysics of Unidentified Flying Objects by William Markowitz (*Science* 157, 1274, 1967). Markowitz (1907–1998) was an Austrian-born astronomer who worked at the U.S. Naval Observatory and also taught astronomy and physics at Pennsylvania State University and Marquette University. He was a pioneer in the use of atomic clocks for astronomy. Markowitz wrote, "Aristotle wrote on natural phenomena under the heading 'physics' and continued with another section called 'metaphysics' or 'beyond

physics.' I use a similar approach here. First I consider the physics of UFO's when the laws of physics are obeyed. After that I consider the case where the laws of physics are not obeyed. The specific question to be studied is whether UFO's are under extraterrestrial control." By the laws of physics, he is concerned with only the simplest and best-known ones, like those of motion, gravitation, conservation of energy, and the restrictions of special relativity. He points out an obvious but seldom-noted problem: "Apart from propeller and balloon action, a spacecraft can generate thrust only by expelling mass." And something that uses propellers or balloons is an aircraft, not a spacecraft.

> If an extraterrestrial spacecraft is to land nondestructively and then lift off, it must be able to develop a thrust slightly less than its weight on landing . . . if nuclear energy is used to generate thrust, then searing of the ground at 85,000 deg C should result, and nuclear decay production equivalent in quantity to those produced by an atomic bomb should be detected. This has not happened. Hence, the published reports of landing and lift-offs of UFO's are not reports of spacecraft controlled by extraterrestrial beings, if the laws of physics are valid.
>
> We can reconcile UFO reports with extraterrestrial control by assigning various magic properties to extraterrestrial beings. These include "teleportation" (the instantaneous movement of material bodies between planets and stars), the creation of "force-fields" to drive space ships, and propulsion without reaction. The last of these would permit a man to lift himself by his bootstraps. Anyone who wishes is free to accept such magic properties, but I cannot.

To those following the controversy at that time over the "scientific study of UFOs" championed by J. Allen Hynek and Jacques Vallee, an "ulterior motive" for the Markowitz article was immediately apparent. The previous year Hynek had a letter published in *Science*, arguing that UFOs were worthy of scientific study (*Science* 154, 329, 1966). Markowitz carefully notes several instances where Hynek and his colleagues contradicted themselves in their statements about UFOs. For example, in his letter in *Science*, Hynek wrote, "Some of the very best, most coherent reports have come from scientifically trained people." But Markowitz noted that Hynek had written quite the opposite in his article in the *Encyclopedia Britannica* in 1964: "It appears unreasonable that spacecraft should announce themselves to casual observers while craftily avoiding detection by trained observers." Markowitz further noted that Vallee's 1966 book *Challenge to Science* presents the "classic" 1948 sighting of pilots Chiles and Whitted, who reported a dramatic close encounter with a huge metallic object while flying a DC-3; "the book fails to mention that Hynek had identified the object as an undoubted meteor in his report of 30 April 1949 to the Air Force. . . . This omission is curious because Hynek wrote a foreword to *Challenge to Science*." These and other self-contradictions, carefully noted by Markowitz, showed that the Hynek/Vallee case for the UFO was utterly lacking in intellectual rigor. Markowitz unmasked the real Hynek: disorganized, indecisive, and confused. This revelation, published in the peer-reviewed pages of *Science*, was fatal to the credibility of Hynek's proposed "scientific study of UFOs." There were, and still are, a few scientists who took Hynek's UFO theorizing seriously, but they have always been a tiny minority.

What about "wormholes"? Some fans of interstellar travel are well aware of the extreme difficulties involved in actually traveling to interstellar destinations. So they hypothesize easier ways to reach interstellar destinations without the pesky problem of traversing every point between them. Maybe we can warp space so that the distance between Earth and the Andromeda galaxy is not two million light years, as in ordinary space travel, but far, far less? Suppose there is a wormhole with one end where we now are, and the other where we want to go?

However, according to Wikipedia:

> Wormholes which could actually be crossed, known as traversable wormholes, would only be possible if exotic matter with negative energy density could be used to stabilize them. (Many physicists such as Stephen Hawking, Kip Thorne, and others believe that the Casimir effect is evidence that negative energy densities are possible in nature.) Physicists have not found any natural process which would be predicted to form a wormhole naturally in the context of general relativity, although the quantum foam hypothesis is sometimes used to suggest that tiny wormholes might appear and disappear spontaneously at the Planck scale, and stable versions of such wormholes have been suggested as dark matter candidates. It has also been proposed that if a tiny wormhole held open by a negative-mass cosmic string had appeared around the time of the Big Bang, it could have been inflated to macroscopic size by cosmic inflation.

So a wormhole is something that might theoretically exist, although its actual existence is frankly extremely dubious. There is no reason to think that they could occur naturally, and no observational evidence that they actually do exist (unlike black holes). Even if they do exist, they may exist only on the Planck scale (subatomic quantum size). It seems extremely dubious that traversable wormholes exist in nature, and even if they do, we still have seemingly insurmountable problems. How do we find wormholes? How do we determine whether they are stable? How do we know what their destination is? If we go into one, is it possible to return? There is also the problem of simply getting to the wormhole's mouth. If a wormhole were near our solar system, we would already detect its disturbing effects of warped space. And if it were far from our solar system, we would need to develop interstellar travel simply to travel to the wormhole's mouth! So the idea of using wormholes as a convenient transportation network to wherever in the universe we want to go is, well, fanciful in the extreme. We can't proclaim it completely "impossible," but the person who proclaims it as a real possibility had better have extraordinarily good evidence that such a thing exists. ■

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Obesity: What Does the Science Really Say?

Since the 1940s, the concept of "energy balance" (EB) has governed obesity research worldwide. Springing intuitively from the laws of thermodynamics, this model proposes that excess adiposity results whenever energy intake overtakes energy expenditure. Thus, the behaviors of overeating and failure to exercise, i.e., "gluttony" and "sloth," have been emphasized over complex metabolic processes and the unique effects certain foods might have on those processes.

The conventional wisdom of EB continues to dominate public policy today. According to the U.S. Centers for Disease Control, "Weight management is all about balance—balancing the number of calories you consume with the number of calories your body uses," and the World Health Organization, "The fundamental cause of obesity . . . is an energy imbalance between calories consumed on one hand, and calories expended on the other."

So instead of testing more sophisticated techniques, dieters are encouraged by self-professed health authorities of all stripes to simply reduce or to count their calories—whether derived from steak, spinach, potatoes, Wonder Bread, or Mountain Dew—as if they were all created equal. Unsurprisingly, the relevant popular science literature also tends to reflect this paradigm. As American nutrition scientists Marion Nestle and Malden Nesheim (2012) reiterate in their new book, *Why Calories Count*, the ingestion of too much energy is "arguably the most important cause of public health nutrition problems in the world today."

Nevertheless, some scientists, physicians, and science journalists have recently challenged the EB equation. In its place, they propose models highlighting the roles of hormones like insulin, leptin, cortisol, and estrogen—even to the absolute exclusion of personal control and responsibility. Here, assorted nutrients—or foods that should be distinguished for their lack of nutrients—are treated very differently because of the chains of metabolic events they are thought to initiate.

For example, Jonathan Wells and Mario Siervo—nutrition researchers from the United Kingdom and Italy, respectively—contend that EB fails to explain, among other things, why people continue to gain weight, rather than plateau, after the point when their gains reestablish energy equilibrium (Wells and Siervo 2011). They also remind

Some scientists, physicians, and science journalists have recently challenged the Energy Balance equation. In its place, they propose models highlighting the roles of hormones like insulin, leptin, cortisol, and estrogen—even to the absolute exclusion of personal control and responsibility.

us that, despite the theoretical logic of EB, neither behavioral prevention nor behavioral treatment has generally proven successful.

"The relationship between energy balance and weight gain," the Europeans argue, "is a truism, not an explanation, hence no direction of causation can be inferred." Indeed, the conventional wisdom of EB might have the "logic" entirely backward. Reversing the direction of causation, Wells and Siervo propose, does not contradict the laws of thermodynamics, or even the EB equation *per se*. But it does permit us to reconsider the associations between behavior, metabolism, and weight change.

The obesity problem is surely a complex and multifaceted one. But testing multiple hypotheses of potential merit is better than testing only one or none at all. By any reasonable standard, our current EB-based strategy has proven largely ineffective.

We've long understood that hormones regulate weight gain—in growing children and pregnant women, for example. And since the 1930s, European clinicians have used insulin—a hormone released from the pancreas in response to elevated blood glucose levels—to fatten underweight patients. Is it just a coincidence that both obesity rates and the consumption of sweeteners and refined carbohydrates have skyrocketed in recent decades?

The obesity problem is surely a complex and multifaceted one. But testing multiple hypotheses of potential merit is better than testing only one or none at all. By any reasonable standard, our current EB-based strategy has proven largely ineffective. "A more skeptical approach," Wells and Siervo expect, "is likely to bring valuable returns."

Pediatric endocrinologist Robert Lustig (2012) agrees that adiposity is a hormonal predicament. In his new book, *Fat Chance*, the child obesity expert indicts simple, super-sweet sugars as the chief culprits, arguing that sucrose and high-fructose corn syrup corrupt our biochemistry and render us helplessly hungry and lethargic in ways fat and protein do not. In other words, Lustig insists that sugar-induced hormonal imbalances cause self-destructive behaviors, not the other way around.

What EB proponents fail to consider, Lustig vies, is the overwhelming and far-reaching metabolic influence of insulin. In the body, it causes energy to be stored as fat; in the hypothalamus it can cause "brain starvation," or resistance to leptin, the satiety protein hormone released from adipose tissue. Excess insulin, or hyperinsulinemia, thus causes our hypothalamus to increase energy storage (gluttony) and decrease energy consumption (sloth). Add to this process an increasingly insulin-resistant liver (which drives blood insulin levels even higher), a little cortisol (the adrenal stress hormone), and sugar dependence (or at least habituation), and dieters, Lustig concludes, hardly stand a chance.

Lustig labels fructose a "toxin" because he believes it drives these events, along with a cluster of maladies and diseases referred to as "metabolic syndrome." Although the glucose that always accompanies fructose will stimulate an insulin response directly, fructose itself will not. It will, however, cause liver insulin resistance, which, in turn, stimulates the pancreas to release even more insulin. Again, leptin resistance may follow. Notable as well is that fructose will *not* decrease the flow of ghrelin—the hunger signaling peptide hormone—from the stomach to the brain.

As such, Lustig deems the EB model of weight gain a dangerous and unscientific myth. First, sugar alone proves that all foods are not beneficial nutrients and, thus, that a calorie is not a calorie. Second, he contends, generally eating less and exercising more is a strategy doomed to failure given the profound and wide-ranging metabolic processes and effects that certain foods tend to generate.

But the most outspoken and persistent critic of EB might be veteran science journalist and cofounder of the Nutrition Science Initiative (NuSI), Gary Taubes. In a recent *Nature* editorial, Taubes blamed the current obesity pandemic on both the research community, for failure to fully comprehend the disease, and the food industry, for exploiting that failure (Taubes 2012). He picks up the theoretical mantle where Lustig leaves it, implicating insulin and condemning fructose, but he expands the list of "nutritional" villains considerably to include all easily digestible carbohydrates that quickly raise glycemic indices.

As Taubes points out, the "hormonal/regulatory defect" hypothesis (H/RD) of obesity is actually nothing new. A German internist, Gustav von Bergmann, proposed it in the early 1900s, and it gained general acceptance throughout Europe prior to the Second World War. But, of course, much changed after the conflict ended. Germans and Austrians struggled to redefine themselves, for example, and the lingua franca of science shifted somewhat abruptly from German to English.

Medical practitioners quickly abandoned H/RD for a different idea articulated in the 1920s by University of Michigan physician Louis Newburgh. "All obese persons are alike in one fundamental respect," the American had argued. "They literally overeat." In attributing excessive weight gain to either a "perverted appetite" or a "lessened

outflow of energy," Newburgh laid an enduring foundation, Taubes contends, for a failed and yet insufficiently tested hypothesis.

Taubes scoured the relevant literature from 1944 onward and isolated nearly 100 experiments (results at nusi.org). In his estimation, however, each study was critically flawed. All free-living trials, of course, lack control over subjects' actual consumption. On the other hand, the more well-controlled experiments lost statistical power due to small sample sizes and short durations.

Some studies severely restricted caloric intake in carbohydrate-limited diets, thus undermining the investigators' ability to determine whether carbohydrate content can influence weight gain independent of total caloric content. Others severely restricted control diets, thereby limiting carbohydrate content as well. Finally, some trials failed to either evaluate low-carbohydrate diets at all, distinguish between macronutrient content, or eliminate habitually lean subjects.

Through NuSI, Taubes (and cofounding physician Peter Attia) plan to fund and facilitate more appropriate studies performed by "independent, skeptical researchers" who are also leaders in the field. Designed to rigorously test competing hypotheses, experimental diets would consist of vastly different macronutrient composition and, they hope, demonstrate that fat can be lost or gained while total caloric intake remains fixed.

Subjects would be ward-restricted and randomized into two groups. One would receive a balanced diet, rich in carbohydrates; the second would be severely carbohydrate restricted—ideally to less than sixty grams per day. Both cohorts would be fed an isocaloric diet matching daily intake to pre-experiment daily expenditure. Studies would persist for at least two months, and energy expenditure, insulin levels, and body composition would be measured at appropriate stages.

Although she admires Taubes's commitment, Marion Nestle believes that such experiments will be exceedingly expensive and tough to manage and interpret. Familiar with his and Lustig's arguments, she maintains that a calorie is still a calorie in the limited context of weight gain. Like many others, she characterizes the H/RD view of obesity as "reductionist," or lacking in nuance, because it fails to consider, among other things, the role of behavior. "Committed, intelligent people," she told me, "must find ways to deal with a food environment that encourages frequent eating of large portions."

Of course some of Lustig's and Taubes's ideas have been widely accepted for some time—the most direct effects of insulin and leptin, for instance. The U.S. Department of Agriculture, for example, has recently supplanted its carbohydrate-ridden food "pyramid" with a "plate" relatively lacking in simple sugars and starches. And even daytime network television doctors now advise audiences to avoid such cuisine.

But these writers' contention that personal control and responsibility have no practical place in the discussion remains highly controversial. The evidence is clear—most (but not all) people who attempt to lose weight and keep it off will fail. Less obvious are the reasons why. Has biology stacked the deck against the overweight and obese to the point of utter hopelessness? Or is it merely a fact of life that, in any context, the vast majority always fails to overcome exceptionally challenging obstacles?

Overweight or not, we all have a substantial interest in settling these debates. Obesity rates have doubled in the U.S. and tripled in the U.K. since the 1980s. Health authorities have drawn persuasive connections between obesity—or the metabolic dysfunction for which obesity is a marker—and a plethora of horrifying diseases, including cancer.

Indeed, recent studies have advised us that obesity is directly responsible for twenty-one percent of all U.S. health-care costs (Cawley and Meyerhoefer 2012), more than even smoking (Moriarty et al. 2012). A genuine medical crisis of this magnitude, I would argue, deserves not so much more attention as it does higher scrutiny. As Taubes urges, Americans in particular can hardly afford not to make the necessary investments. ■

Has biology stacked the deck against the overweight and obese to the point of utter hopelessness? Or is it merely a fact of life that, in any context, the vast majority always fails to overcome exceptionally challenging obstacles?

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Sandy Hook School Shooting: The Adam Lanza Death Certificate Conspiracy

Q: Is there any chance you could put my mind at ease and explain why the Social Security Death Index would list [Sandy Hook shooter] Adam Lanza as having died on December 13, 2012, the day before the Sandy Hook shooting? His mother is listed as dying on December 14. How accurate is the Index? I'm at my wit's end. I am sincere in my inquiry. Thank you.

—B. Gee

A: I received the above query shortly after a piece I wrote about the Sandy Hook conspiracies received national media attention in early February. For the week afterward I got dozens of emails, many of them hate-filled, accusing me of being part of a government cover-up. I replied briefly to a few of the more benign ones, ignored the rest, and got back to work. But this email seemed more reasonable, though I was wary of getting mired in spending countless fruitless hours trying to track down and answer any conspiracy claim I'm asked about. Years of experience have taught me that it's often a fool's errand. Nonetheless, I thought I'd try to give this person a template through which to not only research the question but also understand conspiracy thinking as well.

I responded to the writer: "I can try to look into the issue for you, but I'll need more information. To start, where did you confirm that the Social Security Death Index listed Adam Lanza as having died on December 13, 2012? If you can point me to the verified original source I may be able to help you."

In response, he sent the following, along with a screenshot of the web page: "I confirmed it myself by searching the index via Ancestry.com. The index is apparently accessible from any genealogy site. Genealogy Bank seems to be the link everyone is using." Sure enough, the page had Lanza's death listed as December 13, 2012, the day before he attacked the school in Newtown, Connecticut, killing nearly two dozen children and adults. I responded: "To answer your question, I don't know. I still would like to see the original coroner's report (instead of just a screen shot of a website), but I agree that it appears that the death date is wrong. Without having access to the original death certificate, or knowing who typed what up, my best guess is that it's a typo."

Government employees at the local, state, and federal level are not known for their perfection and accuracy. Just last week a friend of mine was enrolling his daughter in elementary school and noticed that some government office drone had mistyped his daughter's date of birth in the official school records. He wanted to get it fixed in case it would be a problem later on, and he was told he'd have to fill out three forms in two different departments (Department of Education and the local school) to get it fixed. He decided not to bother with it, since the date is pretty close (it's only off by a few days, and the month is the same) and there's no harm done. But that means there's a slight discrepancy between her birth certificate and the school's official records. If (god forbid) she's ever killed in a school shooting, this could be seen by conspiracy folks as evidence that something is suspicious when in fact it's good old incompetence—the kind that happens every day but is usually ignored, later corrected, or never even noticed unless dates are cross-checked for some reason.

A similar "suspicious typo" comes up with Elvis conspiracies: Why is Elvis Presley's middle name (Aaron) misspelled on his tombstone? Many conspiracy theorists point to this "mistake" as evidence that something suspicious is afoot, including that he was buried somewhere else, or may even be alive. The fact is that Elvis wanted his name changed from the original Aron to Aaron, so that's what was done even though that's not his original name. There's no mystery.

I'm not making excuses, just of-

fering my best guess. I think the real issue—assuming that it's true that Lanza's death date is one day off from the actual one—is what do you think it means, if anything? What conclusion are you, or anyone else, drawing from that fact? That Lanza was actually dead the day before dozens of people saw him walk into Sandy Hook school? That someone else killed the teachers and children? (If so, who and why?).

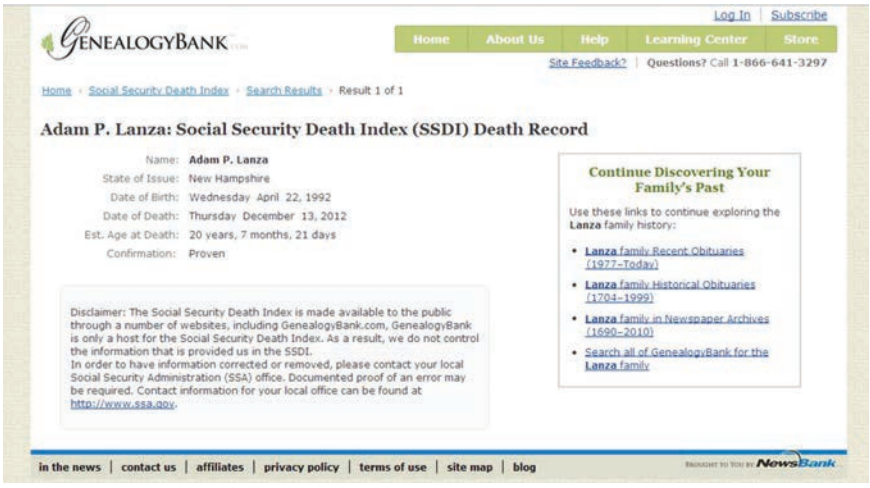
Nancy Lanza's death certificate indicates she was pronounced dead on December 14 as the result of multiple gunshot wounds. Obviously Adam was alive on December 14, regardless of what the SSA listing says—unless of course someone else killed his mother and the people at the school? (If so, who and why?)

In science we have an important scientific principle called Occam's Razor. This idea is that if you have a phenomenon to be explained and several different theories are proposed as solutions, the simplest one (or the one with the fewest assumptions) is likely to be the correct answer. So here's the question: Is it more likely that A) someone somewhere made a simple typographical mistake entering the date in a computer (something that happens countless times a day in matters both large and small) and that Adam Lanza was actually killed December 14, as evidence and dozens of eyewitnesses can testify to first-hand; or B) that Lanza actually died one day earlier, and that some unknown person caused the Sandy Hook shooting for reasons no one has explained, and Lanza was being blamed for it, again for reasons no one has explained? And so on.

I'm not telling you what to think, and honestly I don't care whether you think a conspiracy exists, or that there's anything sinister or suspicious about the (apparent) error on a database. You asked for my opinion, and I've given you my best answer. If you find out more about it, I'll be interested to hear.

He wrote back thanking me for my comments but was clearly not completely satisfied, and we ended our correspondence. That is, until two weeks later when I came across a story in the Huffington Post that addressed this issue:

> Conspiracy theorists have seized on the error as yet another reason to think that Lanza is a false flag for the shooting. How could the Social Security Administration have made such an error? The mistake may not have been made by the Social Security Administration. The Death Master File—a database with information on millions of dead people that is used to prevent identity theft—is compiled from the social security records of Americans whose deaths have been reported to the Social Security Administration. Whoever reported Lanza's death may have made the error. HuffPost contacted the Social Security Administration's Danbury, Conn., office, which is responsible for the town of Newtown, where Lanza lived. A representative for the office said it was possible they had made a mistake, but a copy of the death certificate would be needed to change the error.
>
> However, there is no death certificate for Adam Lanza—yet. Lanza's certificate will become available after it's been filed with the Newtown Registrar of Vital Records. That will happen once the case is completed, said Debbie Aurelia, the Newtown town clerk. But the case won't be completed until the toxicology reports are finished, which "won't happen too quickly," the office of the Medical Examiner told HuffPost over the phone. (On Jan. 17, CNSNews reported that state police said the report is still "several months away.") Even if the Social Security Administration made the mistake, it wouldn't be the first time it's happened. In fact, between May 2007 and April 2010, more than 36,000 people were reported as dead by the Social Security Administration although they were still alive, CNN reported in 2011. A 2012 report by the Office of the Inspector General found the Social Security Administration failed to record the deaths of about 1.2 million people. Clearly, it is not immune from making mistakes; even the agency itself refuses to guarantee the accuracy of the Death Master File. HuffPost has requested a copy of Adam Lanza's death certificate and will update the story when the request is fulfilled.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Home › Social Security Death Index › Search Results › Result 1 of 1
Adam P. Lanza: Social Security Death Index (SSDI) Death Record
Name: Adam P. Lanza
State of Issue: New Hampshire
Date of Birth: Wednesday April 22, 1992
Date of Death: Thursday December 13, 2012
Est. Age at Death: 20 years, 7 months, 21 days
Confirmation: Proven
Disclaimer: The Social Security Death Index is made available to the public through a number of websites, including GenealogyBank.com, GenealogyBank is only a host for the Social Security Death Index. As a result, we do not control the information that is provided us in the SSDI.
In order to have information corrected or removed, please contact your local Social Security Administration (SSA) office. Documented proof of an error may be required. Contact information for your local office can be found at http://www.ssa.gov.
Continue Discovering Your Family's Past
Use these links to continue exploring the Lanza family history:
Lanza family Recent Obituaries (1977-Today)
Lanza family Historical Obituaries (1704-1999)
Lanza family in Newspaper Archives (1690-2010)
Search all of GenealogyBank for the Lanza family
in the news | contact us | affiliates | privacy policy | terms of use | site map | blog
NewsBank

I contacted him with the link, and he wrote back: "Thank you. It's good to see a mainstream source finally addressing it. I think what disturbed me the most was how close I came to thinking maybe there was something to this claim. I knew it had to be a mistake, but what an absolutely irresponsible mistake to make. Perhaps data entry has been outsourced as well. Anyway, thanks for taking the time to correspond."

Sometimes critical thinking outreach is done one person at a time. ■

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Stuart, Hunter. 2013. Sandy Hook hoax theories explained: Why Newtown 'truther' arguments don't hold up. *Huffington Post* (February 11). Online at http://www.huffingtonpost.com/2013/02/11/sandy-hook-hoax-theories-explained-debunking-newtown-truther_n_2627233.html#died.

Nurturing Non-Science

Startling Concepts in the Education of Physicians

Early in its history, the National Center for Complementary and Alternative Medicine awarded grants to incorporate CAM information into traditional medical school curricula. Have these grants had a positive effect on public health?

Eugenie V. Mielczarek and Brian D. Engler

Imagine if departments of physics, chemistry, and biology of our most prestigious universities offered courses in astrology, crystal-ball gazing, alchemy, and creationism. And imagine if these endeavors were funded by the National Science Foundation (NSF) and if the head of NSF appeared at an international conference celebrating these endeavors. Would there be an outcry from the science community? If you answered yes, then you must be unaware that the paradigm for this is already in place and there has been no outcry. Since 1998, $76 million in grants for courses and training in non-science based medical protocols such as acupuncture, magnets, Reiki, Therapeutic Touch, Qigong, mind-body myths, naturopathic treatments, and Vedic medicine have been funded by the National Institutes of Health (NIH), the federal agency charged with research in medical sciences. Fifty-three of these awards went to academic medical schools and associated organizations. Figure 1 shows funding from NIH's National Center for Complementary and Alternative Medicine (NCCAM) for twenty-four of these fifty-three. Figure 2 shows funding for organizations teaching non-MD specialties. Table 1 compares NCCAM's funding for curriculum development with its awards for several alternative medicine protocols.

The absence of an effectively organized disapproval from the scientific and medical community constitutes an indifference to teaching "healing protocols" that have no place in modern medicine and drain our scarce medical resources.

Even prior to its elevation to an NIH center, the Office of Alternative Medicine (OAM) was committed to funding grants for specialty centers at many institutions that evolved into CAM training or curriculum awards. An examination of the first seven years, 1993–2000, a detailed review (Green 2001), listed twenty-eight grants of which twelve were for specialty centers.

NIH's earliest awardees that transitioned from specialty awards to curriculum development were Bastyr Naturopathic College, Palmer College of Chiropractic, and Oregon College of Oriental Medicine, an acupuncture college (http://xnet.kp.org/permanentejournal/fall02/editorial.html). These organizations train practitioners who believe they can heal medical problems with non-science based protocols.

This substantial fiduciary encouragement of non-science, non-evidence-based curriculum by NCCAM, NIH's untested center, was in direct conflict with its mission "to exemplify and promote the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science" and with the "mission of NCCAM . . . to define, through rigorous scientific investigation, the usefulness and safety of complementary alternative medicine interventions and their roles in improving health and health care" (http://www.nccam.nih.gov/about/plans).

NCCAM's website also provides

education for anyone seeking education in CAM. Units are earned toward a "continuing education certificate" through NIH's NCCAM site (www.nccam.nih.gov/health/decisions/credentialing; www.nccam.nih.gov/training/videolectures).

These websites are presented without any critique of CAM protocols (Sampson 2001; see also www.sciencebasedmedicine.org/index.php/yes-we-can-we-can-abolish-the-nccam). Worse, NCCAM also describes how to obtain CAM certification from a private organization, the National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM), which issues diplomas in acupuncture, Chinese herbology, Asian bodywork therapies, and oriental medicine. Currently forty-three states plus the District of Columbia license practitioners of acupuncture and oriental medicine. Almost all of these states require completion of NCCAOM's national written exam, and some states also require a practical exam. There is no mention on NCCAM's website of the failure of any of its research grants to discover any scientific validation of these protocols.

Starting in 2002, only four years after its inception and before any of its research grants showed positive results for CAM, NCCAM decided to fund teaching CAM. It awarded $28.5 million in R25 education grants to fifteen organizations: twelve medical schools, two nursing schools, and one foundation. The program's "immediate goal was to encourage and support the incorporation of CAM information into medical, dental, nursing, and allied health professional school curricula, residency training programs, and continuing education courses. A longer-term goal was to accelerate the integration of CAM and conventional medicine" (www.nccam.nih.gov/grants). The R25 awards plus the inclusion of CAM curriculum under other programs to medical schools, previously regarded as stellar proponents of science-based education, became a springboard that

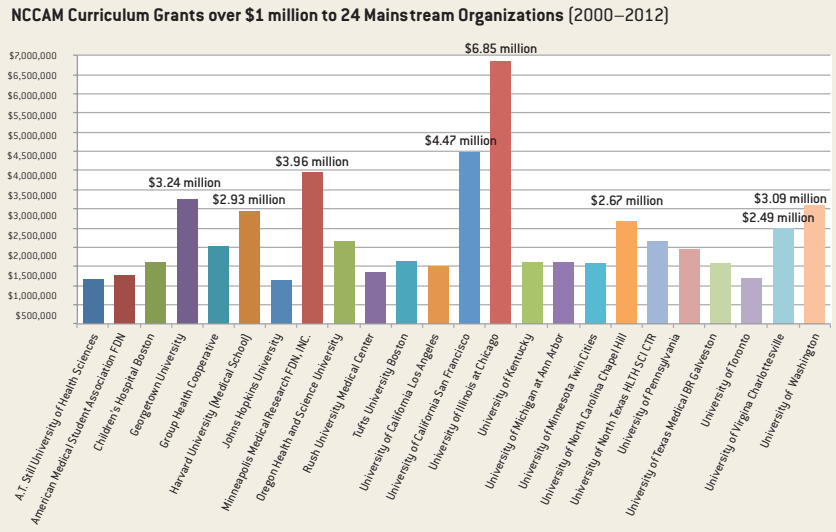

Figure 1. Total of all fifty-three mainstream organizations 2000-2012 (to date) = $67.1 million. (twenty-four organizations with awards of over $1 million displayed here)

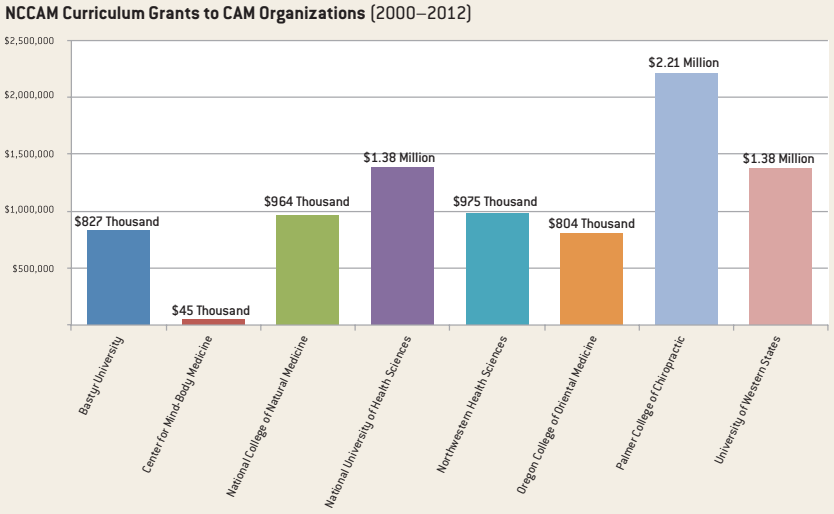

Figure 2. Total of eight awards to CAM organizations (2000–2012) = $8.6 million.

PROGRAM/PROTOCOL	FUNDING
Botanicals	$193 million
Mind-Body	$157 million
Acupuncture	$78 million
CAM Curriculum Development and Training	$76 million
Distance Healing*	$22 million
Mushroom Extract	$3 million
Magnetic Fields	$2 million
Maharishi Vedic Medicine	$0.4 million

Table 1. CAM Curriculum Development and Training funding compared to several CAM protocols also funded by NCCAM since the late 1990s. *Included in Distance Healing: Reiki, Qigong, Therapeutic Touch, and prayer.

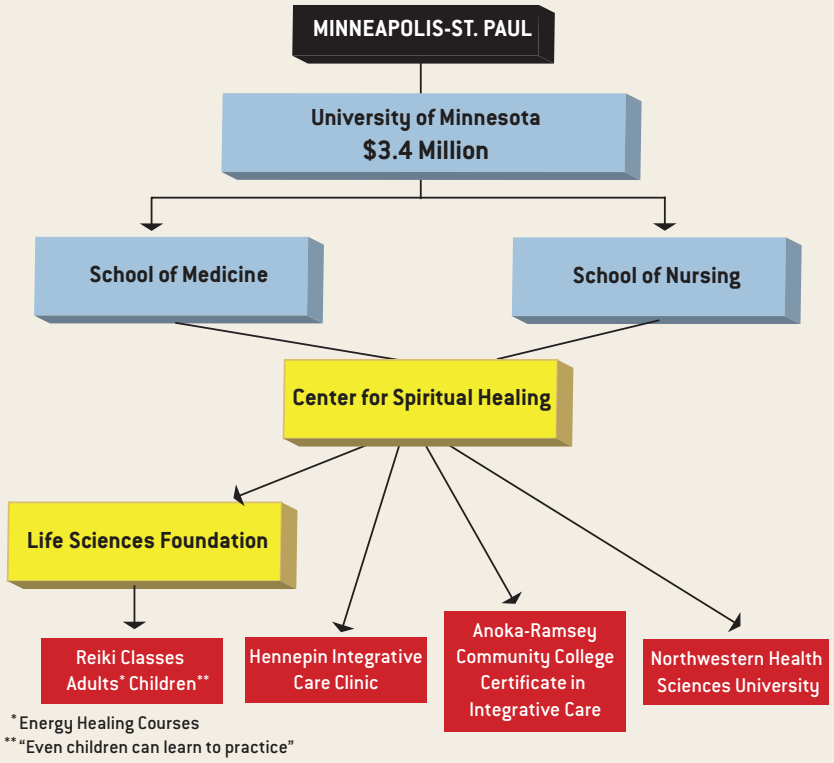

Figure 3. The reach of non-proven CAM protocols into the Minneapolis-St. Paul community.

propelled CAM services into community hospitals.

But NIH does not limit studying CAM to medical students. From 2000–2012, the total sum of awards falling under the mantle of CAM pedagogy to both mainstream medical schools and CAM schools was $76 million.

Many of the earliest and most largely funded curriculum grants were awarded to medical schools in metropolitan areas such as Minneapolis-St. Paul, Boston, Washington, D.C., Charlottesville, Chapel Hill, Baltimore, San Francisco, and Seattle. Practicums required for students and resident training are part of a medical school's services to community hospitals and clinics. It's fair to ask: What have we gained in community health by funding teaching of untested medical practices? Did NIH's establishment of well-funded curriculum centers of non-science based protocols affect these communities?

We answered this question by tracking the flow of CAM offerings from the initial grant to the medical school into several communities.

Minneapolis-St. Paul

One of the largest efforts of NCCAM curriculum development, $3.9 million, has been directed to Minneapolis-St. Paul. From 2000–2004, the University of Minnesota (Mary Jo Kreitzer, P.I.) was awarded $1.5 million from NCCAM ". . . to integrate complementary and cross-cultural care and spirituality into the academic, research, and clinical programs of [its] Academic Health Center (AHC)." Minnesota's Academic Health Center includes the Schools of Medicine and Nursing, with its Center for Spirituality and Healing providing "the infrastructure for drawing together CAM practitioners, medical school, and nursing faculty"; a comprehensive program that included mentoring both medical school and nursing faculty, and hospital grand rounds. Dr. Kreitzer is currently the director of the University's CAM Program "Center for Spirituality & Healing and the Life Science Foundation."

Featured on the latter's website is an interview with Russell Targ, a proponent of psychic abilities and remote-viewing (http://takingcharge.csh.umn.edu/interviews/interview-russell-targ-0). In 2009, this CAM program affiliated with a local clinic, Hennepin Integrative Health Services, offering acupuncture and chiropractic care. Also associated with the Center for Spirituality and Healing are community college programs at Anoka-Ramsey Community College, whose certificate includes energy healing courses. Some of the center's courses were Reiki classes for all ages—which advertised that even "children can learn to practice" (http://takingcharge.csh.umn.edu/explore-healing-practices/reiki/what-can-i-expect-typical-reiki-session).

In addition, from 2001–2006 the Minneapolis Research Foundation (Richard Hugo Grimm, P.I.) was awarded $4 million for training CAM clinical investigators. The proposals emphasized the growing social need to serve Americans desiring CAM. It detailed the cooperation of six health institutions in the area and graduate degrees in CAM at the University of Minnesota. Participating institutions included not only the Hennepin Integrative Health Services but also a chiropractic college, Northwestern Health Sciences University. The total funding from NCCAM into the Minneapolis community from 2000–2006 for CAM was $5.5 million. Figure 3 illustrates the reach of these non-proven protocols into the Minneapolis community.

Washington, D.C.

From 2001 to 2006, Georgetown Medical School received $3.2 million (Hakima Amri and Aviad Haramati, P.I.s) to establish a center for Complementary and Alternative Medicine. In 2003, Georgetown became the first medical school in the country to offer a master's degree in CAM (http://som.georgetown.edu/about/prospectus/facilities/). Courses include mind-body studies, legal issues associated with CAM, and a course in Western and Eastern philosophical concepts: "verify[ing] the importance of the link between mind, body, and spirit in health and healing." Courses in acupuncture, yoga,

and meditation purportedly address the mechanisms by which these modalities improve health and promote healing. The center's website advertises: "graduates are employed by NIH, and alternative medicine foundations." Adjunct faculty includes directors of homeopathic institutes and energy medicine and mind-body institutes. They serve as chairs of the accreditation commission for acupuncture and oriental medicine. One faculty member has served as president of the International Society for the Study of Subtle Energies and Energy Medicine. Georgetown's medical school has an institutional relationship with two CAM institutions: Bastyr and the National University of the Health Sciences (NUHS). Bastyr University, a naturopathic institution in Washington State, had received $800 thousand in curriculum grants from NCCAM. The academic affiliation (between Bastyr and Georgetown) is intended to ". . . break down the silos that hold the disciplines apart and create relationships between the disciplines and the educational institutions that prepare the nation's future healthcare providers." In 2011, Georgetown agreed to share students and faculty with the National University of Health Sciences, which offers degrees in chiropractic, naturopathic medicine, acupuncture, and oriental medicine. The National University of the Health Sciences also has received almost $1.4 million in NCCAM curriculum funds.

A member of Georgetown's faculty practices integrative medicine in Northern Virginia (Kaplan Integrative Medicine), offering services in Reiki and acupuncture (http://www.kaplanclinic.com). Inova health care in Northern Virginia, affiliated with Georgetown, offers CAM. Inova's service for Reiki, located in its Children's Cancer Clinic, is listed on the hospital's website. It is one of the services offered by Inova Cancer support groups that meet at the Inova Loudon medical campus (http://www.inova.org/healthcare-services/cancer/locations/inova-loudoun-hospital/support-groups-and-programs.jsp; http://www.centerforreikiresearch.org/Downloads/HospitalListTable.pdf). George Washington University Hospital and the Washington Hospital Center also offer CAM services.

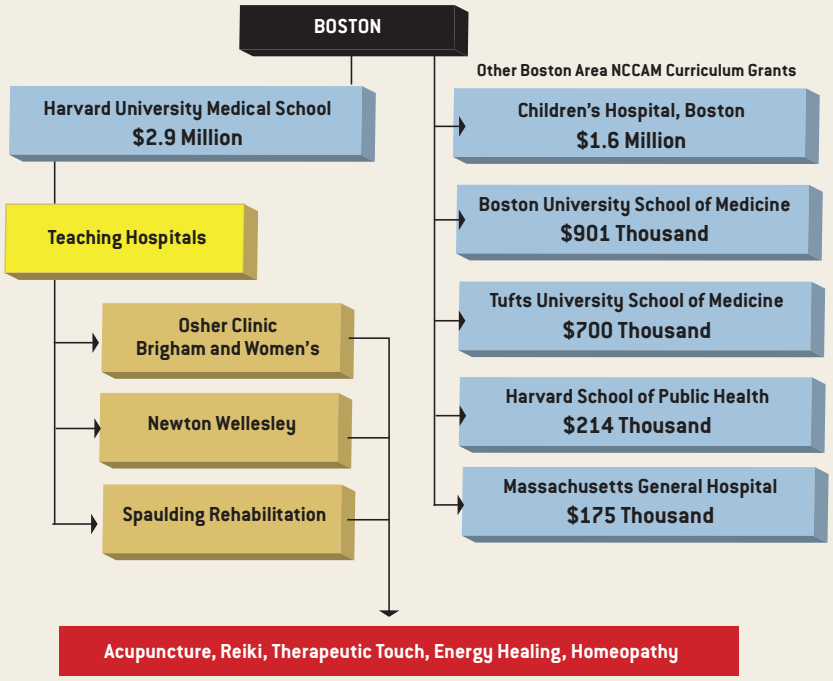

Figure 4. NCCAM funded training in a number of institutions is reflected throughout the Boston metropolitan area.

Boston

Harvard Medical School received $2.9 million from NCCAM for training in CAM (Russell Scott Phillips MD, P.I.). Some examples of elective courses offered by Harvard Medical School include: Spirituality and Healing in Medicine (ME726M.0), Mind-Body Medicine (ME 729.0), and Interdisciplinary Rehabilitation of Patients with Chronic Pain (ME554M.27) that includes acupuncture as a protocol (http://www.medcatalog.harvard.edu/).

Other institutions in the greater Boston area receive NCCAM training funds as well. Figure 4 tracks how this training is reflected in clinics serving patients in the Boston metropolitan area.

Charlottesville

The University of Virginia's School of Nursing includes the Center for Study of Complementary and Alternative Therapies; Ann Gill Taylor is the director of the Center. Originally awarded funds in 1993 for a specialty center aimed at pain, from 1995 through 1998 she was funded to study whether magnetic mattress pads were effective for pain relief for patients with fibromyalgia (Alfano et al. 2001). From 2000 to 2011 she was funded $2.5 million to train health professionals in CAM, curriculum and clinical training. Recently, a five-year K07 NCCAM Academic Career Award program ". . . enables her to study leadership training" at the University of Virginia Darden School of Business. Her focus is "directed toward sustaining a program of CAM-related research that investigates mind-body interventions, body-based practices, and electromagnetic and other energy modalities." A recent publication (Anderson and Taylor 2012) stated "Biofield Therapies are CAM modalities that involve the direction of energy healing through the hands to facilitate well-being by modifying the energy field of the body." Their paper gives a history of five energy therapies: Healing Touch, Johrei, Polarity Therapy, Reiki, and Therapeutic Touch. It urges, "Oncology nurses should familiarize themselves with biofield therapies." There is no recognition in their paper of studies by scientists that human physiological fields are many thousands of energy units below the natural energy of the

noise level of the cell and thus the fundamental laws of physics preclude the initiation of any chemistry (Adair 1991, 1992, 1998; Bennett 1994).

Baltimore

Brian Berman, professor of Family Medicine at University of Maryland Medical School in Baltimore, received $20 million from 1999 to 2010 from NCCAM for the Center for Integrative Medicine (CIM), an interdepartmental center within the University of Maryland School of Medicine (www.compmed.umm.edu/default.asp). The Center was founded in 1996 under Berman's leadership. Its offices and integrated medical clinic are based at the James L. Kernan Hospital (www.kernan.org/cim/index.htm). "A core component of CIM's mission is to evaluate the contribution of complementary therapies to patient care and healing in an outpatient, integrated medical clinic." The Center's "highly qualified staff of practitioners and medical doctors is dedicated to providing an optimal therapeutic environment." Faculty at the Center includes specialists in treating illness with acupuncture, Qigong, reflexology, Reiki, mind-body medicine, homeopathy, and Holographic Sound Healing (http://www.compmed.umm.edu/patient_pract.asp; http://www.compmed.umm.edu/pathways/index.asp).

Chapel Hill

North Carolina's population is nine million; 15 percent are below poverty level. Its health care system spans the state, reaching both mountainous and metropolitan areas, including the highly educated Research Triangle area. The system serves 253,000 patients. Its expenditures include $276 million in uncompensated care. The University of North Carolina's medical school graduates physicians who serve all counties of the state (www.unchealthcare.org/site/aboutus/unc-health-cares-impact-across-north-carolina.html).

The University of North Carolina's Medical School was awarded a $1.6 million R25 five-year curriculum grant to train CAM Physicians. Principal Investigators were Peter Curtis, MD, and Susan Gaylord. Its Integrative Medicine program is housed in the Department of Physical Medicine and Rehabilitation at UNC's Medical School at Chapel Hill (www.med.unc.edu/phyrehab/pim/). Director of the Program on Integrative Medicine, Associate Professor Susan Gaylord has a PhD in psychology and is a specialist in Tibetan meditation practices.

The program includes an Integrative Medicine Consult Service. John Douglas Mann, MD, director of Clinical Services for Integrative Medicine and the Consult Service, also codirects the UNC Mindfulness Program. He has received NCCAM funding for clinical research and educational projects relating to CAM for the past seven years totaling $2.5 million for research and training fellowships, research in Korean acupuncture, and clinical trials in treating migraines using magnets (Mann et al. 2008).

The consult service provides ". . . short- and long-term support to inpatients as well as outpatients. . . . Patients and families can request a team assessment and CAM therapies such as acupuncture, homeopathy, hypnotherapy, biofeedback, nutrition and supplements counseling, mindfulness training, and energy healing" (www.med.unc.edu/phyrehab/pim/clinical-services). These clinical services include six faculty in mind-body services and four in acupuncture. One "mindfulness" faculty member lists, in addition to mind-body-spirit medicine, her credentials in ancient mystical ethnographic traditions, shamanic counseling, energy healing, and harmonizing (http://www.med.unc.edu/phyrehab/faculty/). Tuition for nine two-and-a-half-hour lecture courses in the mindfulness program range from $200 for graduate students to $395 for the general public.

The UNC's Medical School Integrative Medicine in Residency (IMR) is incorporated over the three years of residency (www.carolinashealthcare.org/integrative-medicine-medical-education). The program is a combination of web-based curriculum, program-specific exercises, and group process-oriented activities. Required courses include Mind-Body Medicine and Spirituality Energy Medicine.

UNC's Integrative Medicine program's 200-hour curriculum is part of the Arizona Center for Integrative Medicine, University of Arizona. From 1999 to 2012, the University of Arizona has received $3.2 million in training grants and $25 million in research grants that include homeopathy and Reiki for animals.

One "mindfulness" faculty member lists, in addition to mind-body-spirit medicine, her credentials in ancient mystical ethnographic traditions, shamanic counseling, energy healing, and harmonizing.

San Francisco

Between 2000 and 2012, the University of California at San Francisco (UCSF) received nearly $4.5 million in NCCAM grants to augment its curricula for health professionals. These grants included R25 funding to help instill "awareness of the self as an instrument of healing" in medical education, and to fund the Collaborative Advances in Clinical Health Education (CACHE) program in partnership with Stanford University School of Medicine. Other grants fund a five-year project to "develop, implement, evaluate, and disseminate a multi-disciplinary, interprofessional curriculum in integrative medicine."

UCSF established the Osher Center for Integrative Medicine in 1997, and it is this center that offers to the public classes such as those shown in Figure 5. The core curriculum of UCSF School of Medicine includes nine required courses in integrative medicine as well as thirteen elective courses; examples of the latter are shown in Figure 5 (http://www.lanterntec.com/preview/osher/p1/education/integrative-medicine-curriculum/elective-courses/).

While public classes and professional courses such as these are not unique in our society, offering them through a mainstream university medical school, partially funded by taxpayer dollars via the National Institutes of Health (NIH), conveys an impression of credibility for these unproven techniques.

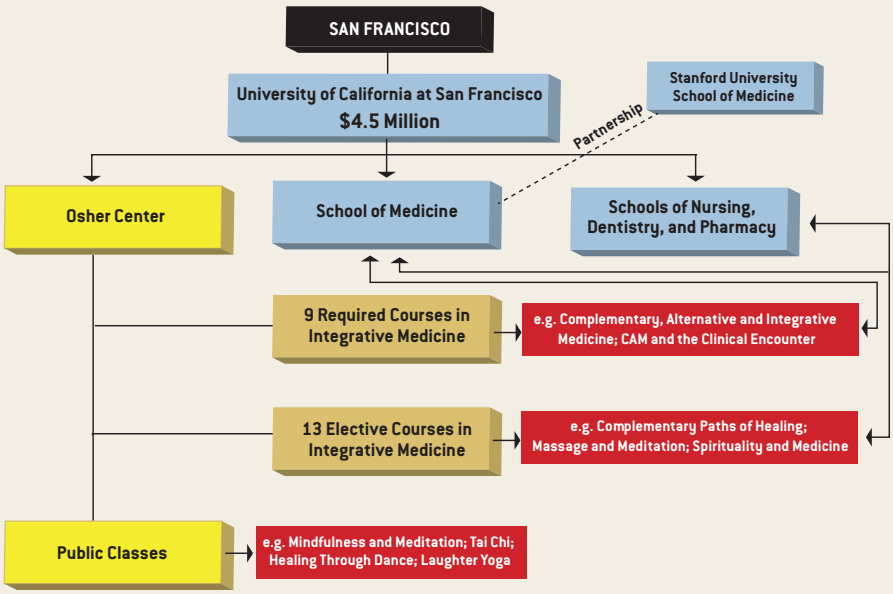
SAN FRANCISCO
University of California at San Francisco
$4.5 Million
Stanford University School of Medicine
Partnership
Osher Center
School of Medicine
Schools of Nursing, Dentistry, and Pharmacy
9 Required Courses in Integrative Medicine
e.g. Complementary, Alternative and Integrative Medicine; CAM and the Clinical Encounter
13 Elective Courses in Integrative Medicine
e.g. Complementary Paths of Healing; Massage and Meditation; Spirituality and Medicine
Public Classes
e.g. Mindfulness and Meditation; Tai Chi; Healing Through Dance; Laughter Yoga

Figure 5. Integration of CAM into UCSF Medical, Nursing, Dentistry, and Pharmacy programs and into the San Francisco community.

Seattle

Between 2001 and 2006, the University of Washington (UW) in Seattle received nearly $3.1 million in curriculum grants to "enhance the integration of information about CAM therapies into UW health sciences curricula" and to establish a CAM Curriculum at UW (www.son.washington.edu/research/grants/ShowAbstract.asp?ProjectID=106&Refer=FCN).

Asserting (without evidence) that "important but under-exploited adjuncts to conventional health care" and institutionalizing, up front, an apparently close alliance with Bastyr University in Kenmore, Washington, about one-half of the funds granted were used by the UW School of Nursing to educate the nursing faculty so they could, in turn, "value and integrate CAM content into the nursing curricula." This integration of unproven therapies included required courses and clinicals at undergraduate, master's, and doctoral levels. A program to evaluate program effectiveness was included as were a number of initiatives to link the school with community assets in order to enhance the integration of CAM content into the nursing curricula, but with no apparent parallel focus on actual efficacy of the CAM therapies chosen to be taught.

The other half of the funding went to the UW School of Medicine and was intended to achieve, among other goals, better communication between UW medical students and CAM students and practitioners in order to "initiate a respectful interchange of information and ideas between practitioners of these different paradigms of healing."

A paper published in *Academic Medicine* (Marcus and McCullough 2009) evaluated "… the quality of the evidence cited in the evidence-based CAM curricula" of R25 grant recipients. They based their evaluations on web-published curricula with respect to four popular CAM therapies—herbals, chiropractic, homeopathy, and acupuncture. Specific findings regarding the UW curricula included that UW seems to encourage "open-mindedness" regarding homeopathy and a measure of support for acupuncture. Their general findings were that these curricula "were strongly biased in favor of CAM," that "many of the references were to poor-quality clinical trials," and that, even so, these referenced studies "were five to six years out of date." Based on what they found, the authors concluded that these integrative medicine curricula represented "an educational failure."

And yet the integration continues. In the case of cancer, UW maintains an online "Guide to Integrative Oncology" for clinicians and patients. Their "About" page (http://depts.washington.edu/integonc/clinicians/about.shtml) reveals the collaboration among a UW physician who also is an officer at the Seattle Cancer Care Alliance and CAM practitioners, including a psychologist who "has designed and taught courses in mind/body medicine,

cross-cultural healing modalities, consciousness-based healing modalities, and spirituality in medicine" and a naturopath, both of whom are faculty members at Bastyr University with concurrent consultant or affiliate research positions at UW School of Medicine. Some anticancer therapies touted in this guide are listed at http://depts.washington.edu/integonc/clinicians/act/.

The close ties between UW and nearby Bastyr University are disturbing because they confer a scientific respectability on Bastyr—a degree-granting institution that features programs in Naturopathic Medicine, Acupuncture and Oriental Medicine, Midwifery, and Herbal Sciences (http://www.bastyr.edu/academics/areas-study). An accredited program called Permaculture leads to a Certificate in Holistic Landscape Design (http://www.bastyr.edu/academics/areas-study/certificate-holistic-landscape-design). Bastyr is expanding. From 2000–2012 Bastyr has received over $12 million in research and curriculum grants from NCCAM, and a San Diego campus was added in Fall 2012. Of even more concern from the standpoints of both science-based public health and the unbridled growth in future health care expenditures, as of this writing Doctors of Naturopathic Medicine are licensed or regulated as health care professionals in sixteen states, the District of Columbia, two U.S. territories, and five Canadian provinces. The alternative medicine industry is actively pursuing expanded licensing of CAM practitioners.

Background

How did American taxpayers become part of a two-decade fiscal morass of mythological non-evidence based delivery of medical care?

From OAM's inception in 1992, the medical and science community questioned the politics, board appointments, and initial funding awards. Policy perspectives were published in *Science* (Marshall 1994; Stone 1997) and *JAMA* (Eskinazi 1998). A recounting of the politics of congressional pressure from Senator Tom Harkin, Congressman Berkley Bedell, and Congressman Jim Moran was published in the *New Republic* (Satel and Taranto 1996). Scrutiny by the National Council against Health Fraud and the testimony of OAM's first director, Joseph Jacobs, MD, demonstrated how congressional interference forestalled any objections from medical scientists. This interference was responsible for Jacobs resigning after two years (Atwood 2003; http://www.sciencebasedmedicine.org/index.php/yes-we-can-we-can-abolish-the-nccam). The second director, Wayne B. Jonas, MD, 1995–1999, was a homeopath with interest in Noetic Sciences (Jonas and Jacobs 2009; Gorski 2001) In 1999, Congress legislated that OAM should be elevated to an NIH Center, the NCCAM, with Stephen E. Straus as its director. Josephine Briggs, its current director, has served since 2008. From its beginning in 1992 to present, its annual budget has increased sixty fold at a cost of $2 billion in federal funds.

How did American taxpayers become part of a two-decade fiscal morass of mythological non-evidence based delivery of medical care? … Congress's enthusiastic endorsement of alternative medicine as a medical protocol was matched by the executive branch.

Congress's enthusiastic endorsement of alternative medicine as a medical protocol was matched by the executive branch. Under the leadership of President Clinton, ostensibly in "response to public demand," a White House Commission was created in 2000 (Report White House Commission 2002). Its mandate was "to develop legislative recommendations to maximize potential benefits to consumers and American health care of therapies such as chiropractic, acupuncture, massage, herbs, nutritional and mind-body concepts as well as other approaches." The commission expressed concern about ensuring the safety of products and practices but demonstrated ignorance of science by not reporting on their efficacy. Its priority was that "people looking for therapies that are both more helpful and less burdened by side effects" (a holistic perspective related to traditional systems of healing) would be recognized by federal funding.

The commission of twenty members included a chiropractor, medical doctors, acupuncturists, a nurse, a grandmaster of Qigong, a dentist, a naturopath, a social worker, herbal healers, and a business man, Thomas Chappell, president of Tom's of Maine. The chairperson, James S. Gordon, MD, a psychiatrist, was director of the Center for Mind-Body Medicine in Washington, D.C. (Quackwatch Archives: William Jarvis and Patrick Curry). Gordon's credentials included being a proponent of homeopathy and orgone therapy and being a believer in UFOs. The credentials of the commission were questioned by journalists and physicians familiar with aberrant medical practices (Curry 2001; Gorski 2001).

Conspicuously absent from the

commission were Nobel Prize winners in medicine, officers of scientific research societies, and members of the science research community. None of its members were physicists, biochemists, biologists, or teachers of core science curricula required for entrance to medical school.

The Commission recognized that "most CAM modalities had not yet been proven safe and effective" and recommended training health care practitioners to ensure the safety of CAM. The report emphasized that conventional and CAM systems of health and healing should be held to the same rigorous standards of good science. Some of the members, with established fiduciary interests in homeopathy, orgone therapy, acupuncture, and the myth of bioenergy healing, might not have been appropriate to evaluate the unsubstantiated claim that American taxpayers were insisting on federal funding of CAM. The committee asked for federal support, publication of results in peer-reviewed journals, and reimbursement for CAM therapies based on published evidence. Its recommendations implied that reports would be publicly issued on the efficacy of these non-science based protocols.

Congress and the executive branch had forced NIH to respond to a social phenomenon incompatible with extending the best in medical care to communities, an expensive legacy. Surprisingly, the premier research center of our federal government, intended to improve the health of Americans, complied by assuming that protocols of alternative medicine were a foregone conclusion. Instead of waiting for the results of initiatives in research, which might have negated the concept, NIH's NCCAM generously funded installation of these concepts into the curriculum of medical schools and funded non-MD organizations. Congress, NIH, and some academic institutions pursued this integration with missionary zeal.

NCCAM's funding for teaching energy medicine (e.g. Reiki, acupuncture, and mind-body therapies), has created a caricature of community health care. These curriculum grants continue as an expensive endeavor with no perceptible increase in health in these communities.

The reality is, after almost twenty years and almost $2 billion, there is no evidence of CAM improving the health of a community. When will Congress recognize that no evidence exists to sustain these adventures into mythology? How will these services in unproven beliefs, some of which violate the laws of science, which are now mandated to be covered by the nation's health care laws, add to our health care costs? The executive and legislative branches of a seemingly intelligent government nurture this waste. ■

Notes

1. Recent publications relating to this subject by the authors include:

Eugenie V. Mielczarek and Brian D. Engler. 2012. Measuring Mythology: Startling Concepts in NCCAM Grants. Skeptical Inquirer 36(1) (January/February): 35–43.
Eugenie Mielczarek and Derek Araujo. 2011. Power Lines and Cancer, Distant Healing and Health Care. Skeptical Inquirer 35(3) (May/June): 40–44.
Eugenie Mielczarek and Derek Araujo. 2009. A fracture in our health care: Paying for non-evidence based medicine (September 28). Available online at www.centerforinquiry.net/uploads/attachments/A_Fracture_in_our_Health_Care_Paying_for_Non-Evidence_Based_Medicine.pdf .
Eugenie Mielczarek. 2010. Fields, Alternative Medicine, and Physics (May 27). Available online at www.sciencebasedmedicine.org/?cat=11; accessed August 6, 2011.

2. Data from grants referred to in this paper can be accessed from http://projectreporter.nih.gov/reporter and http://clinicaltrials.gov/.

3. A major source on the history of the establishment of the Office of Alternative Medicine and the establishment of NCCAM are the archives of Quackwatch, accessible online, published by the National Council against Health Fraud.

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Adair, Robert K. 1991. Constraints on biological effects of weak extremely-low-frequency electromagnetic fields. *Physical Review* A 43: 1039–48.

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Climate Change Denial in the Classroom

An instructor presented misleading and incorrect climate science to thousands of undergraduates at a prominent Canadian university, prompting an important inquiry on science denial, academic freedom, and the pursuit of truth.

CHRISTOPHER HASSALL, CHRIS A. HEBBERN, AND CARLEY J. CENTEN

A person who continues to hold to a position despite an extensive body of scientific evidence to the contrary can be said to be "denying" the science. The more vociferous deniers will attempt not only to defend their position but also to promote their ideas regardless of contradictory evidence and, finding little traction within the scientific world, will employ a variety of tactics to influence public opinion. Investigations have successfully exposed the coordinated, well-funded tactics of those who seek to deny established science on topics including tobacco smoke, evolution, acid rain, and the ozone layer. Climate change is but one more case in recent years where science is under attack and, as in many other instances of science denial, we have seen the fight taken to the classroom.

The authors—members of the Committee for the Advancement of Scientific Skepticism (CASS), a group of scientists and other experts working within the Centre for Inquiry Canada—heard complaints from students about the content of a climate science course being taught at a Canadian university and decided to evaluate the scientific merit of the lectures. What we found was disappointing. In a thorough and rigorous analysis of the course material, we documented numerous errors and misinformation being taught. As we brought our concerns to light, we observed that our substantive concerns were deflected with accusations from the course instructor of attempting to suppress academic freedom. Understood within the context of science denial, it is easy to see that this accusation is nothing but a distraction: there is a fundamental difference between the honest pursuit of truth through the examination of alternative views and the dissemination of information that is demonstrably false.

Background: Tracing the Connections

On December 15, 2011, Professor Tim Patterson testified before a committee in the Canadian Senate (one of the two Houses in the Canadian legislature) and stated that "Hundreds of . . . studies show [that] the sun, not variations in carbon dioxide. . .appears to be the most important driver of climate change" and ". . . it is global cooling, not warming, that is the major climate threat to the world" (Patterson 2011). Both statements are incorrect: solar activity is responsible for around 14 percent of total warming, and solar activity is currently declining while environmental temperature continues to increase (Lockwood and Frohlich 2007). As we discuss below, the claim of a threat from global cooling is based on the dominance of astronomical climate factors that now play a minor role compared to anthropogenic factors. Professor Patterson, a fully tenured professor at Carleton University in Ottawa, Canada, is one of a minority of scientists who espouse views that run counter to the established science on anthropogenic global warming (AGW). At Carleton, he runs the ERTH2402 course, "Climate Change: An Earth Sciences Perspective," which has been taught to thousands of students over a number of years.

In the Winter term of 2009, Professor Patterson went on sabbatical, and the Department of Earth Sciences hired Tom Harris to teach in his place. Where Patterson is a well-respected re-

searcher with more than 100 scientific publications and large research grants, Tom Harris is a trained engineer and former employee of the public relations firms APCO Worldwide and High Park Advocacy Group, both of which have lobbied on behalf of the energy industry. In 2005, while employed at APCO, Harris worked with Friends of Science, and following his departure from APCO has subsequently led the Natural Resources Stewardship Project and the International Climate Science Coalition (groups that question the scientific evidence for anthropogenic climate change). In 2011, he was appointed as an "Expert Advisor" to the Heartland Institute and spoke at the Institute's coal industry-funded "International Conference on Climate Change" in Chicago in May 2012, where his teaching of the course at Carleton featured prominently in his published biography.

The appointment of an individual with such a background to a teaching position in a prominent Canadian university raised important questions: How does a person who disagrees with a body of scientific literature present said literature in a pedagogical environment, and what bearing does the concept of academic freedom have on the right to teach a non-mainstream, controversial view of a scientific topic? We have access to the material from only one year of the course, and so our analysis is based solely on those lectures. However, Tom Harris has stated that 95 percent of the material that he presents was the same as that presented by Tim Patterson, suggesting that our criticisms may apply to the course when it ran in other years. Furthermore, we critique only the material that was taught, and do not intend our criticisms to reflect on the individuals involved.

How Do "Climate Skeptics" Teach Climate Science?

We had been told by students and faculty, who preferred to go unnamed in publication, that concerns had been expressed over the ERTH2402 course, but no action had been taken by the university. The department declined to respond to our questions about course content after it shelved the course in the fall of 2011, citing only curriculum scheduling considerations.

Following the commencement of the course, CASS conducted a provisional survey of the material and found serious problems, including a troubling slant against the scientific evidence for anthropogenic climate change. This is not necessarily prohibited by the academic freedom clause in the instructor's contract, which permits the teaching of personal opinion. However, it is also reasonable to demand that those opinions must be supportable by the peer-reviewed scientific literature. All too frequently, this was not the case in the material we examined. Over twenty-seven hours of ERTH2402 lectures—broadcast not only online but also through local cable television—we recorded 142 verbatim instances of equivocal or incorrect scientific claims. Readers can see our full report for themselves at www.scientificskepticism.ca, but it is worth mentioning here the instructor's "take home slogans," as these verbatim quotes offer a brief glimpse of the central course message.

A Denialist Toolbox

In the concluding lecture, the instructor left his students with five "slogans."

1. "The only constant about climate is change." This first take-home message is based on a logical fallacy known as "affirming the consequent": it is asserted that climate has changed in the past due to natural forces; climate is changing now; therefore natural forces must be at work. However, this is faulty reasoning. Now we are able to attribute changes in contemporary climate to the various forces (factors that affect the balance of energy entering and leaving Earth's atmosphere), to demonstrate that anthropogenic forces have the greatest effect on contemporary climate change (Huber and Knutti 2012).

2. "Carbon dioxide is plant food." This is an example of the "fallacy of exclusion": leaving out important information that would otherwise undermine the argument. Of course carbon dioxide is essential to plant growth, but this ignores other factors such as sunlight, water, nutrients, soil, and ecological variables (such as other species that have positive or negative effects on plants). In fact, the complexity of the system makes it impossible at present to predict the global responses of plants to climate change (Gornall et al. 2010).

3. "There is no scientific consensus about climate change causes." This "slogan" is a variation on the "Nirvana fallacy": that because something (in this case agreement on anthropogenic global warming) is not perfect

or complete then it cannot be correct. However, a survey of 1,372 climate researchers showed that 97–98 percent of climate researchers support AGW, and that supporters of AGW had published more, higher impact papers on climate science than dissenters (Anderegg et al. 2010). Reviews of the scientific literature have shown no dissent from the consensus opinion (Oreskes 2004) and subsequent surveys of scientists have suggested that dissent from consensus is due to the current *underestimation* of the anthropogenic input (Bray 2010).

4. "Prepare for global cooling." Arguments for global cooling rely on predictions of weak solar forces over the coming decades. While solar activity did seem to match environmental temperature over the first half of the twentieth century, "over the past 20 years, all the trends in the Sun that could have had an influence on the Earth's climate have been in the opposite direction to that required to explain the observed rise in global mean temperatures" (Lockwood and Frohlich 2007).

5. "Climate science is changing quickly." The final take home message is a variation on the "argument from ignorance," relying on the absence of complete proof and the hypothetical possibility of contradictory scientific evidence. From looking at the scientific literature—perhaps best summarized in the Intergovernmental Panel on Climate Change (IPCC) reports—this is not the case. Climate science is undergoing refinement and not revolution, attested to by the increasingly confident statements made by the IPCC between its founding in 1988 and the latest report published in 2007.

These five "take home slogans" provide a sense of the confusing messages presented in ERTH2402: students are told that climate always changes, that the science is in flux and there's no scientific consensus but at the same time they should expect global cooling (by far the most often repeated claim), and, besides all that, CO_2 is a good thing. That, we suspect, is the point. If the ultimate goal of the presenter is to create the impression of debate where none exists, then it doesn't matter if the arguments used are contradictory. As the instructor emphasizes a number of times during the course, "some of the most basic tenets . . . [of the climate change debate] . . . are either not true or are simply unknown, or highly debatable." During media interviews after the CASS report was released, the instructor stated that "the overall thrust of the course is we don't know" (De Souza 2012). This idea of presenting a debate where there is none is not new. There is a history of special interest groups that have promoted controversy, debate, and uncertainty in the public discussion on topics including tobacco smoke and cancer, acid rain, and climate change by misrepresenting the facts and relying on unrepresentative scientists to give the impression of science in turmoil (Oreskes and Conway 2010).

The University Classroom: A New Denialist Arena

We've seen this playbook before. "Presenting both sides of the debate" or "teaching the controversy" has been argued to justify the presentation of marginalized and unsupported opinions alongside or in place of science; readers will be familiar with their use to justify teaching intelligent design in schools, for example (Scott and Branch 2003). The strategy can easily be adapted to climate change. To that end, the Heartland Institute, for which both Tim Patterson and Tom Harris are Expert Advisors, has recently contracted out the development of a K-12 curriculum that explicitly aims to emphasize "controversy." The curriculum will include:

> "modules" for grades 10-12 on climate change ("whether humans are changing the climate is a major scientific controversy"), climate models ("models are used to explore various hypotheses about how climate works. Their reliability is controversial"), and air pollution ("whether CO_2 is a pollutant is controversial") . . . on environmental impact ("environmental impact is often difficult to determine. For example there is a major controversy over whether or not humans are changing the weather"). . . . (Heartland Institute Media Release 2012)

Where we have a teacher misinforming students about climate change, as happened at Carleton, we can see at least two unwelcome outcomes: (1) students taking scientifically accurate courses in climate change elsewhere in the university will be required to provide answers that they have learned contradict established science but must

do so in order to pass (a complaint that was voiced by staff and students regarding the course), or (2) students will come away from this course convinced that they have learned the truth of what is going on in the climate change debate—but have instead been misled. A student stated in an email to one of the authors: "I took the course two years ago (it was required for my program) and I found it ridiculous—if you wanted to get a good grade you had to answer exam questions based on his [the instructor's] opinion."

Similar consequences have also been revealed in another case in the past year, when students at Auckland University exposed associate professor Chris de Freitas for teaching climate denial to first-year geography students that drew largely from climate change denial blogs and American-based think tanks. In that case, as in our own investigation, the principle of academic freedom was raised by some as a defense (Thompson 2012).

Academic Freedom and the Pursuit of Truth

According to the Association of Universities and Colleges in Canada (AUCC):

> Academic freedom is the freedom to teach and conduct research in an academic environment. Academic freedom is fundamental to the mandate of universities to pursue truth, educate students, and disseminate knowledge and understanding. . . . Unlike the broader concept of freedom of speech, academic freedom must be based on institutional integrity, rigorous standards for enquiry, and institutional autonomy, which allows universities to set their research and educational priorities.

We agree, and the importance of academic freedom cannot be understated. The freedom that academics enjoy—the freedom to hold dissenting opinions, to research topics of their choosing, and to speak their opinions—must be balanced by an obligation to convey accurate information when teaching. This is especially true for high school and undergraduate courses where students require an introduction to the basic concepts in a given field. It is only once those basics have been grasped that the students can engage critically with the material that is being presented. Graduate students in particular could benefit from a course that presents material that runs counter to what they have been taught previously, so long as the assessment methods permit critical reflection. This was not the case at Carleton, nor could it be in any course so obviously slanted against mainstream science.

We certainly do not advocate that Carleton University in any way limit the freedom of academic staff to speak their opinions or conduct research. Lehigh University, which employs Michael Behe, a leading proponent of intelligent design creationism, does not limit his freedom to speak publicly on the subject or to research it. However, both Behe's webpage and the Department of Biology's webpage carry disclaimers: the department is forthright in stating "While we respect Prof. Behe's right to express his views, they are his alone and are in no way endorsed by the department. It is our collective position that intelligent design has no basis in science, has not been tested experimentally, and should not be regarded as scientific." Behe does not teach intelligent design to his students, but he remains free to hold contrary viewpoints. Perhaps a similar approach could be used when academics hold minority opinions on the science of climate change, so that academic freedom can be balanced with the obligation to teach factual information to students. Rather than a suppression of freedom, this kind of scrutiny would simply provide "peer review" for teaching, a step that is essential to progress in all other aspects of research.

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Education and Communicating Science

A number of lessons can be learned from our skeptical foray into the climate change debate. First, climate change deniers are not above using similar tactics to those attempting to push the teaching of creationism into classrooms ("teach the controversy," "there's no consensus," "academic freedom"). This follows a failure on the part of both climate change deniers and creationists to make significant inroads with the peer-reviewed scientific literature.

Second, universities can and should be held to high academic standards when teaching scientific disciplines, especially considering the efforts of groups like Heartland to have climate change denial added to educational curricula. Steven Novella's discussion of the Australian group Friends of Science in Medicine provides a good overview

Students, researchers, and the general public should be conscious of the presence of pseudoscience in universities and be critical of material presented there.

of arguments for tightening up academic standards while maintaining academic freedom, pointing out that "such freedom does not extend to the point of teaching demonstrable pseudoscience as if it were a legitimate science" (Novella 2012).

Even with these two factors borne in mind, it is unclear as to whether traditional styles of teaching and science communication will be effective in the cases of topics like climate change. Dan Kahan's research group at Yale University investigates what is known as "cultural cognition"—the way in which people judge the value of facts (particularly relating to risks) based on their own social values. Viewed through the framework of cultural cognition, simply presenting the evidence might be insufficient to convince the public (and students) of a particular viewpoint. Kahan and his group have found that cultural preconceptions play a significant role in determining the perception of risk from climate change (Kahan et al. 2012), vaccines (Kahan et al. 2010), and nanotechnology (Kahan et al. 2009). These social and psychological factors must be taken into account when presenting evidence for climate change within a pedagogical environment.

In conclusion, we look forward to continued engagement with the climate change debate by the wider skeptical community. Past campaigns of science denial in other fields have faltered due to the concerted efforts of skeptics and scientists to expose faulty arguments, funding networks, and underlying interests. Students, researchers, and the general public should be conscious of the presence of pseudoscience in universities and be critical of material presented there. We must not permit the use of academic freedom as a cover for the teaching of incorrect information, especially where the result is the failure to provide young scientists with the proper tools to advance critical thinking. ■

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New Information Surfaces on 'World's Best Lake Monster Photo,' Raising Questions

The famous "Mansi photo" of the Lake Champlain monster has been held up for decades as strong proof for cryptozoology—the so-called best evidence for the existence of a hidden animal. Yet, newly uncovered documents reveal troubling questions about the photo and the circumstances surrounding it.

ROBERT E. BARTHOLOMEW

Introduction

On Tuesday afternoon, July 5, 1977, Sandra Mansi of Bristol, Connecticut, knelt on the shores of Lake Champlain somewhere between St. Albans, Vermont, and the Canadian border, and snapped what is widely touted as the best lake monster photograph ever taken. *In Lake Monster Mysteries: Investigating the World's Most Elusive Creatures*, their scholarly study of lake monster traditions, Benjamin Radford and Joe Nickell observe that "the Mansi photo stands alone as the most credible and important photographic evidence of the existence of lake monsters" because its authenticity "is held in such high regard by so many writers and researchers" (Radford and Nickell 2006, 43). It has become the Holy Grail of Lake Monsterdom, and a steady stream of journalists has made the pilgrimage to Vermont to hear Sandra Mansi recount the tale of what she reported seeing that day.

Two other famous lake monster photographs that once held similar positions have not stood the test of time. On April 19, 1934, British surgeon Robert Wilson reportedly captured an image of the Loch Ness Monster. Nicknamed "the Surgeon's photo," the picture fell into disrepute in 1994 when, shortly before his death, Christian Spurling reportedly confessed his involvement in the hoax by fitting a toy submarine with a sea serpent's head and neck fashioned from wood putty in an effort to fool the *Daily Mail* (Radford and Nickell 2006). After snapping his famous photo, Wilson himself later claimed that he did not believe in Nessie, and his youngest son openly admitted that the photo was a fraud (Binns 1984, 96–97). Ironically, prior to its exposure, several scientists had concluded that there were strong similarities between Wilson's image and the Mansi photo, suggesting that "Champ" and "Nessie" may be similar species. Richard J. Greenwell, an optical science professor at the University of Arizona, remarked in 1981 that the ratio between the head and neck "was very much the same in both animals," (Bartholomew 1981) and naturalist Charles Johnson concurred (Johnson 1980, 1).

During the 1970s, Eric Frank Searle snapped a series of well-publicized photos of Nessie. The pictures created a media buzz, exciting lake monster enthusiasts and connoisseurs of the unexplained, and elevated the native of Middlesex, England, to celebrity status. His photos were later exposed as fakes by future BBC journalist Nicholas Witchell in his 1975 book *The Loch Ness Story*. Searle died in Lancashire, England, in 2005 after living the rest of his life in obscurity (Tullis 2005).

The Power of a Photo

This year will mark the thirty-second anniversary of the Mansi photo's public release in the *New York Times* on June 30, 1981, which triggered a short-lived media feeding frenzy, allowing Champ to bask in the world media spotlight (Wilfred 1981). While the hoopla soon died down, the Mansi photo remains a staple of photographic evidence in numerous books on cryptozoology, a relatively new field devoted to the scientific study of "hidden animals" that was founded in 1975 by Belgian zoologist Bernard Heuvelmans.

The photo's stature cannot be underestimated and was credited, in part, with helping to build the political momentum necessary for an international Champ Conference at Shelburne, Vermont, on August 29, 1981. Among the participants who were attracted to the meeting: Roy Mackal, professor of biology at the University of Chicago, and Roy Zug, a zoologist from the Smithsonian Institution. Champ's public profile was further enhanced the next year by the passage of two bills protecting it from harm by both the New York and Vermont State legislatures. These resolutions were useless as practical documents but essentially served as free publicity. Radford and Nickell (2006, 45) attribute publicity surrounding the photo for the Champ renaissance of the early 1980s and note that when Radford visited the Champ sighting board in Port Henry, New York, in 2004, nearly half of the 132 sightings were dated 1981 or 1982. They credit the Mansi photo with singlehandedly triggering a bandwagon effect "whereby widely publicized sightings lead to other reports independent of an actual creature's presence or absence."

New Questions

Soon after the photo's existence first came to light in the fall of 1979, the first red flags appeared. The original photo was sent to Philip Reines, a nautical expert at the State University of New York at Plattsburgh, with the hope that he could authenticate it. Reines soon learned that the two most crucial elements in verifying the photo were missing. Sandra Mansi said that she had thrown away the negative, and that she could not locate where she snapped the photo. Images purportedly taken of monsters are notoriously blurry and vague; here was a spectacular image in full color, but without the negative or location it was impossible to determine with any degree of certainty what was in the photo. Possessing the negative would allow the image to be magnified to see greater detail, while knowing the location could reveal important clues such as the object's size and distance, and whether the photo was even taken on Lake Champlain. When Reines could not authenticate the photo, Sandra and Anthony Mansi were soon insisting through their lawyer that the photo be returned, which he reluctantly did.

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In researching my new book *The Untold Story of Champ*, I uncovered two important pieces of information that had previously been withheld from the public that cast doubt over the authenticity of the photo. This information was known to Joe Zarzynski when he wrote his book *Champ: Beyond the Legend* (1984), yet despite presenting a detailed analysis of the Mansi photo in it and affirming its likely authenticity, this information was left out.

The Missing Negative

Sandra Mansi has always maintained publicly that she threw away the negative. This would have been a very unusual practice for the period because during the era of pre-digital cameras, most people kept their negatives in case they needed duplicates or the original was destroyed. This is especially baffling given that she took a picture of what she believed to be a prehistoric creature in the lake, arguably one of the most important zoological photographs of the twentieth century. But kept hidden from the public was a letter written in August 1980 by Vermont's official naturalist Charles Johnson who expressed concern after talking to the Mansis in person. He wrote that there "was a discrepancy over what happened to the negative: Mrs. Mansi said they threw it away, something they did with all the negatives of pictures they took; Mr. Mansi, talking to me alone, said they buried it (or burned it . . .) since their experience had been somewhat fearful" (Johnson 1980, 1).

Besides contradicting Sandra Mansi's account, if the picture was so distressing as to necessitate burning or burying the negative, why even keep the photo pinned on a bulletin board in the kitchen, where it would likely be seen on a daily basis? In 1981, two journalists interviewed Sandra Mansi separately and were told the same story: that after the image came back from Fotomat, it was either tacked or pinned to the kitchen bulletin board (Kermani 1981; Smith 1981). That same year Sandra Mansi told journalist Jeff Wright that in the two and a half years before they

showed the photo to Reines: "Our children would bring their friends in and show them" the photo (Wright 1981, 5). Yet in 1992, when interviewed by John Lenger from the Glens Falls, New York, *Post-Star*, Sandra Mansi said that as soon as it came back from developing, she "hid the photo in an album behind another photo. And it stayed there for years" (Lenger 1992). In 2003, she told Ben Radford a similar story: That the photo had been hidden in an album (Radford and Nickell, 2006, 45).

So, did Sandra Mansi hide the photo in an album and keep it a family secret for years, or was it tacked to the kitchen bulletin board where her kids were showing it off to their friends? The original photo looks quite different from the image that the public sees; it is sharper and has scratch marks and is yellowing around the edges. Several years ago Ben Radford flew to Westport, Connecticut, and met with Mansi's attorney where he was allowed to closely examine the original. While Sandra Mansi's recollection of these events may have faded or changed with time, contrary to popular belief her story is certainly not consistent over time.

While Sandra Mansi's recollection of these events may have faded or changed with time, contrary to popular belief her story is certainly not consistent over time.

The Missing Location

Joe Zarzynski, who knew the Mansis intimately, was not overly concerned—at least publicly—over their inability to find the location of their famous photo just a few years after they had taken it. He later wrote: "They were a little bit disoriented. But to their credit, things had changed. What was once a field was now condos and houses. Dirt roads had been paved . . . and there'd been a general facelift" (Citro and Christensen 1994, 108). It is a stretch of the imagination to contend that remote St. Albans, Vermont, had changed dramatically between 1977 and 1980, or that this had any bearing on the inability of the couple to locate the spot. While the lake has 587 miles of shoreline, the Mansis said they took the photo somewhere between St. Albans and the Canadian border—a length of only twenty miles. There is only so much shoreline and so many back roads in that relatively small area. Reines and Zarzynski scoured the shoreline by boat without success. It is difficult to imagine that just two and a half years later the spot could not be located, given that four people were involved. It was not as if Sandy was unfamiliar with the region, having spent part of her early life in the area; her parents lived in Brattleboro and her relatives had a camp near St. Albans. One would think that at least one of the four would be able to recall a nearby landmark—a distinct house, mountain, or sign that would allow them to narrow their search area. Her two children, Heidi-Jo and Larry, were aged eleven and twelve respectively. When they drove off, she said they got the kids something to eat. If they could recall where and how long it took to drive there, one would think they could further reduce the search area. Even with the publicity surrounding the publication of the photo in the *New York Times*, no one has stepped forward to say they could recognize the stretch of shoreline where the picture was supposedly snapped.

In addition to these red flags, Zarzynski withheld another key piece of information from public scrutiny. Despite knowing the importance of finding the location as a means to verify their story, Sandra and Anthony Mansi were remarkably lax in finding it. During early July 1980, at the prompting of Zarzynski, the Mansis spent ten days vacationing in the region and were to spend part of the time trying to identify the site. It was one of the reasons for their trip. Finally, here was an opportunity to validate their photo. Then on July 17, a crestfallen Zarzynski sent Reines a remarkable letter: "For your knowledge . . . the Mansis did not look for the site. They waited until the last couple of days of their vacation to look and according to them bad weather set in. I guess they could not leave the island. . . . I think it was very poor planning on their part." Was this really poor planning or did the Mansis know something they weren't telling? During the final three days of their trip, local weather records reveal that the conditions were fine and zero precipitation fell.

Revisionist Cryptozoology

What should we make of these new revelations? While the photo may be genuine—that is, of some real unknown object in the lake, whether floating log, lake monster, or something else—and the Mansis truthful, if this is the "best" lake monster photo ever taken, it leaves much to be desired. As for Joe Zarzynski, he can be best described as having been blinded by his desire to believe in Champ to the point where, when he wrote his "definitive" history on the creature, *Champ: Beyond the Legend* (1984), he edited it to reflect what he hoped it would be rather than the reality. His actions bring to mind the adage: "Why let the facts get in the way of a good story." In this regard he is in good company, for as one glances at an

outline of the lake, its glacial symmetry is reminiscent of a Rorschach inkblot test that psychiatrists sometimes use to help their patients describe what they are thinking. As residents and tourists peer onto the vast lake, they typically see what they want to see. If, as most scientists assert, Champ is a creation of the human mind, we may do well to heed the words of Walter Lippmann: "For it is clear enough that under certain conditions men respond as powerfully to fictions as they do to realities, and that in many cases they help to create the very fictions to which they respond" (Lippmann [1922] 2007, 19).

Postscript

In the course of composing this article, Ben Radford provided an audio interview that he and Joe Nickell conducted with Sandra Mansi in 2002. In it she appears to let slip that she knows the location of the sighting but does not want it revealed.

> Ben Radford: "I know that one of the questions that always comes up [about the photo] was where exactly it was [taken], but there's no answer. So, you've looked?"
> Sandra Mansi (shaking her head): "I have no clue . . ."
> Joe Nickell: "We know it was somewhere near—"
> **Sandra Mansi: "I know it's up . . . [pause] Well, I don't want it—I don't want it to get out where it was . . . because of the idiots, you know? . . . I knew once it got out, once the photograph got out there. . . . I was so darn afraid that some idiot with a gun would go out there and shoot at something in the lake . . ."**

For over three decades, in every published interview, Sandra Mansi has steadfastly maintained that she does not know the location—with this one exception where she appears to let her guard down. Is this yet one more example where she has changed her story? If she feared that harm may come to what she believed to be Champ, why not say so and refuse to give out the location on moral grounds, instead of engaging in an elaborate deception, knowing that researchers were spending valuable time and resources conducting searches for the spot, some of which even included the Mansis on them. If she was genuinely concerned for the welfare of Champ, why publicly release the photo in the first place—for money no less—knowing its appearance would draw attention to the lake? In 1979, she even signed a pact with a coworker to serve as a publicity agent for the photo. The man—Roy Kappeler—said that Sandra was obsessed with profiting from the photo, noting: "She would come to work and say things like, 'Are you ready to get rich kid?'" (Koepper, 1981, 1).

Sandra Mansi could help to resolve many of the questions surrounding the photo if she were to reveal its location, which could be given discretely to a select group of researchers. According to Ben Radford, finding the exact spot where the photo was taken would still reap enormous benefits and help to remove the cloud of suspicion that hangs over the photo, including whether it was even taken on Lake Champlain. More precise data could be gained on the object's size, distance, how far out of the water it was, and so on, and if there are sandbars nearby.The field experiments conducted by Radford and Nickell (2006) estimate that the object in the photo is some seven feet long, with the "neck" roughly three feet above the waterline, making a floating log or tree stump a likely candidate. Here is an opportunity to assess these estimates.

At first glance, when one hears the story of Sandra Mansi, it appears to be a straightforward event involving a vacationer snapping a photo of something extraordinary. But like so many accounts in cryptozoology, when one delves below the surface and wades through the facts, the saga grows more convoluted with time. Even if Champ is someday proven to exist, the human saga surrounding it is likely to tell us more about us as a species than about a possible new species in the lake. ■

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OLIVER SACKS on HALLUCINATIONS

An Interview by Indre Viskontas

What causes the startling, unbidden perception of something that seems very real but has no material existence outside of our own minds? The "poet-laureate of medicine," **Oliver Sacks**, takes us through the looking glass and into the fascinating world of hallucinations. Oliver Sacks, MD, is a physician, best-selling author, and professor of neurology at the NYU School of Medicine. He is best known for his collections of neurological case histories, including *The Man Who Mistook His Wife for a Hat* (1985), *An Anthropologist on Mars* (1995), *Musicophilia: Tales of Music and the Brain* (2007), and *The Mind's Eye* (2010). His book *Awakenings* (1973) inspired the 1990 Academy Award-nominated feature film starring Robert De Niro and Robin Williams. Sacks is a frequent contributor to the *New Yorker* and the *New York Review of Books* and a fellow of the American Academy of Arts and Sciences. His newest book is *Hallucinations* (2012).

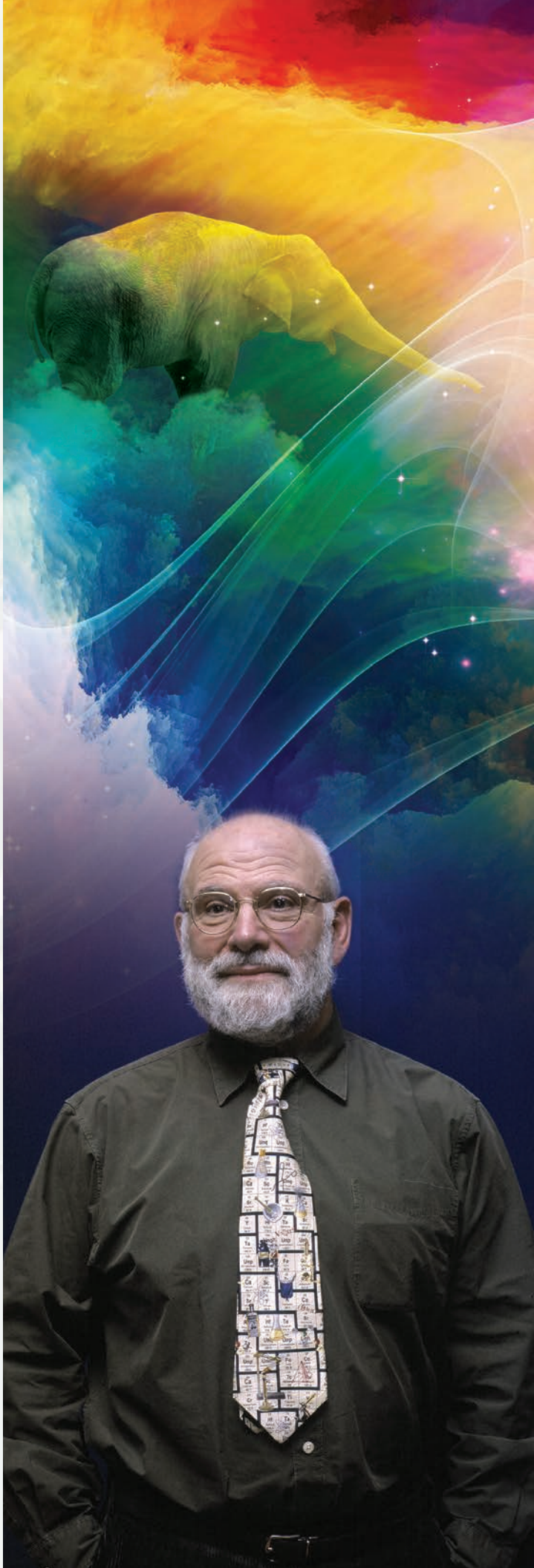
Indre Viskontas, a PhD neuroscientist and a Committee for Skeptical Inquiry Fellow, interviewed Sacks for our Center for Inquiry's *Point of Inquiry* podcast.

You have a new book out called *Hallucinations*, and some of our readers may have already come across an excerpt in the *New Yorker* called "Altered States," in which you describe some of your own experiences with hallucinogenic drugs. But before we delve into that topic, please tell us what is it that distinguishes a hallucination from other fantastical mental experiences, such as waking dreams or imagination?

Well, hallucinations can occur in full consciousness, unlike dreams, and they are projected externally and appear to have a real and objective reality, unlike imagined objects and people. They are similar to percepts (objects of perception) except they are, as it were, forced percepts in which there's nothing there to perceive. It's as if the perceiving parts of the brain have been forcefully activated internally.

I was initially struck by the beginning of your book, where you talk about people who have hallucinations because one of their senses has an absence of stimulation. For example, Charles Bonnet Syndrome, where people who are blind experience visual hallucinations. Tell us a little more about what's going on there.

First, a lot of my work is done in an old-age home. I see a lot of people who have impaired vision or hearing even though they are intellectually quite intact. And a good proportion—I can't say exactly but I would think close to a fifth of these people—develop hallucinations in the mode in which they are defective. So the blind and partially blind



get purely visual hallucinations. Deaf people get auditory hallucinations, most commonly musical rather than verbal. People who've lost their sense of smell can get smell hallucinations.

One might say that people who have lost a limb get limb hallucinations. But I'm not quite sure whether phantom limbs belong in the same category with the others.

I open the book with a description of a patient whom I've been following for many years, who became very dear to me, and I was very sad when she died a few weeks ago, just short of her hundredth birthday. She was a remarkable old lady, strong and clear minded.

The nursing home phoned me saying she was apparently hallucinating and they didn't know what was going on. When I went to see her, she was puzzled. She said, "I've been blind for five years. I see nothing. Why am I seeing things now?" I asked, "What sort of things?" She described scenes with animals, with people looking at her, with falling snow and a snow plow. Very vivid visual vignettes, maybe two or three minutes long, and then there would be another one.

I asked if they were like dreams, and she said, "No, they're like film clips or maybe like going to the theater." Interestingly, she could never recognize the people or places she hallucinated. And she felt that when they did their thing it was autonomously without any relation to her or to her own thoughts or feelings. This is rather characteristic of hallucinations in Charles Bonnet syndrome. Other hallucinations sometimes are charged with affects (emotions) or the sense of familiarity. But not the Charles Bonnet ones.

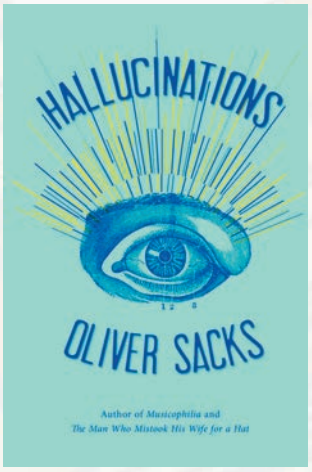
You mention that in the case of these visual hallucinations, they were of unfamiliar things. Whereas, I think you also mention that when people have musical hallucinations they are generally of familiar melodies or tunes or music they have heard before. Is that fair to say?

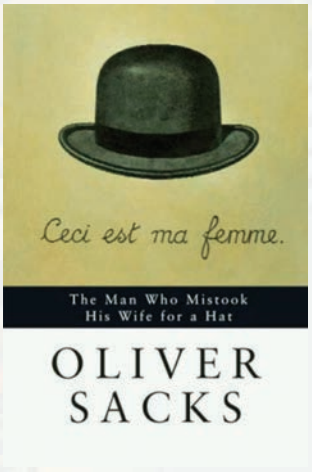
Yes, it's a very striking difference. I've wondered whether it's because music is an already constructed thing, whether one takes in whole pieces of music as opposed to visual things which may not be completed, unless of course, one is hallucinating a painting or photograph. It's very much that what one sees has to be constructed like imagining an image. Whereas the musical ones are very much more like memories.

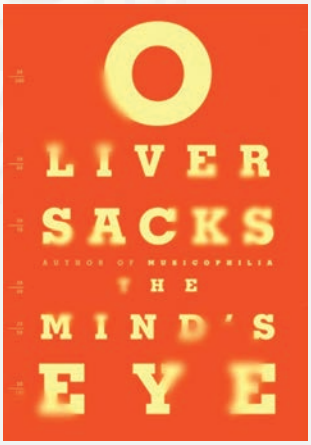
Do you know of any research in which people have looked at what's going on in the brain during these hallucinations? Say, for example, in the visual hallucinations, there's some other part of the brain that's also active that's doing the imagining or creating the scene.

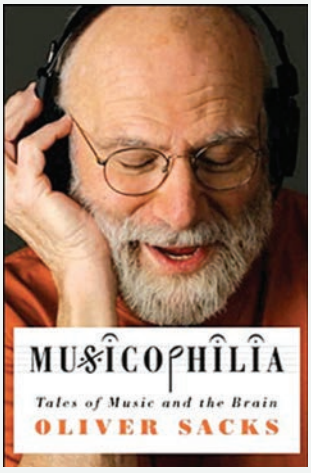
Yes, well, there have been some very beautiful studies that have become possible with the advent of functional brain imaging, fMRI, and more recent forms of imaging, tensor imaging, that shows the white matter. If people were hallucinating faces, there tended to be abnormal activity in the so-called fusiform face area in the back of the right hemisphere in the inferotemporal cortex. If, on the other hand, they were hallucinating words or pseudo-words or letters, lexical hallucinations, then the visual word form area in the left hemisphere would be activated. And it looked very much that those systems of the brain involved in perceptual recognition generated hallucinations of that sort if they were being autonomously stimulated or released.

I think the studies of musical hallucinations have not sorted things out quite in this way because people hear [complete] pieces of









music. What we find is a very widespread activation of all those parts of the brain, including cerebellum, basal ganglia, premotor cortex, and so forth that are activated when one listens to real music.

In these patients who are experiencing hallucinations in the absence of stimulation, and in particular, those healthy people you described who, after three days in a sensory deprivation chamber, began to hallucinate, it almost seems as though the hallucinations are a comfort rather than something they fear. Did you find that patients over time would learn to control either the content or the expression of their hallucinations?

Usually no control, or very little control, was obtained. But there tended to be accommodation. Once people with Charles Bonnet are reassured that there is no psychiatric or neurological calamity and they're not on anything hallucinogenic, they may then become quite accepting of the hallucinations. I quote one man who imagined his eyes saying, "We know blindness is no fun so we have concocted this small syndrome as a sort of coda to your sighted life. It's not much, but it's the best we can do." I'm slightly misquoting him, but that's essentially what he imagined his eyes saying. Charles Bonnet's grandfather who, as it were, was the original subject, would often compare his hallucinations to spectacles in a theater, and would sometimes like to go in a dark room in the afternoon for a hallucinatory matinee.

I was struck along the same lines by a description of a patient you wrote about. Her name was Gertie C. I believe she was a Parkinsonian patient. Could you tell our readers her story?

Gertie was a patient who had had the sleeping sickness, *encephalitis lethargica*, and a post-encephalitic syndrome which immobilized her for decades before she was put on L-dopa. She had all sorts of hallucinations, as do other patients on L-dopa. But it also become clear, when she got to know me and trust me (and I followed her for ten years or more) that she had had hallucinations long before she was put on L-dopa, mostly of a rather pastoral sort. She imagined lying in a meadow or floating in water. When she was put on L-dopa, her hallucinations became more social and more erotic, and apparently she got these quite under control so that she did not hallucinate until the evening. When it was time for her to hallucinate at 8:00 PM, she would say to her visitors, firmly but courteously, that she was expecting a gentleman visitor from out of town, and perhaps they could come another day. Her gentleman visitor, an apparition, would come through the window and brought her much comfort, both social and sexual. But she really seemed to have control of this. It never spread out of control, and it had this sort of humor that was engaging.

But she was an old hand at hallucinating. It may be that some schizophrenic patients—she was not schizophrenic—may also get on comfortable terms in this sort of way with their hallucinations. Incidentally, I mentioned in my book another patient who had Parkinson's disease (not post-encephalitic), and he was also prone to hallucinating visitors. But they never followed him out of the apartment. They were confined to his apartment, and he could get away from them, if he wished, by going outside.

"Charles Bonnet's grandfather who, as it were, was the original subject, would often compare his hallucinations to spectacles in a theater, and would sometimes like to go in a dark room in the afternoon for a hallucinatory matinee."

About a year ago I cohosted a television show on the Oprah Winfrey Network, in which I had the opportunity to investigate claims of miracles across the U.S. Several of the episodes included people who reported having had visions of a religious sense. They would be very offended if I intimated at all that they might have been hallucinating. Is there a difference, at least in the medical field, between what people think of as a religious vision and a hallucination?

Well, there is certainly a difference in character. People are often rather quiet about ordinary hallucinations. But with religious experiences, they may become almost evangelical. There's a book in front of me at this moment which has been much talked about and is on the cover of *Newsweek*. It's called *Proof of Heaven* and subtitled, "A Neurosurgeon's Journey into the Afterlife," by a man called Eben Alexander.

He had a nasty bacterial meningitis. He was in a coma for several days. But when he came to, he described an enormously complex so-called near-death experience. These experiences are often rather stereotyped in quality. People may feel they're in a dark corridor and moving towards some bright light. Feelings of bliss envelop them as they are drawn towards the light. They sense, in a way, that the light is the boundary between life and death. And they would then come back or "float back." In *Musicophilia*, I

described such a sequence with a subject, another surgeon as it happened, who had been struck by lightning.

And he had this sort of blissful moment and then he said, "Slam! I was back." He was back because someone was doing CPR on his heart and his heart started beating again twenty or thirty seconds afterwards. So, his whole cosmic journey only occupied a matter of seconds. Dr. Alexander feels that his cortex was out of action while he was having his visions and therefore it must have been direct supernatural intervention. I think such a claim can't be sustained and indeed, a few seconds of altered consciousness as one emerges from coma would be enough to give him such a state.

People in these states may insist on their reality and feel their lives are transformed. And, as you say, may get angry if one says it was a hallucination. Of course, hallucinations, being brain events in the absence of any sort of objective world around one, can't be evidence of anything, much less proof of anything. Certainly the being in heaven hallucination may *feel* real at the time, but in retrospect, I think many people will almost regretfully say, well, it was a hallucination. It seemed intensely real but it can't be.

But other people may stick with the feeling that they have been vouchsafed a glimpse of the afterlife or, indeed, they have had quite a long sojourn there. One knows that what one had imagined was not reality. But if it leaks into hallucination, it may [seem to] be. I don't think hallucinations are evidence of reality any more than imaginings are.

"People in these states may insist on their reality. . . .Of course, hallucinations, being brain events in the absence of any sort of objective world around one, can't be evidence of anything, much less proof of anything."

I was struck by how you describe almost a continuum of belief in one's own hallucinations. You have people who, for example, on one extreme, have Anton's Syndrome in which they have damage to the occipital lobe and they're blind cortically. But they deny their impairment—despite overwhelming evidence to the contrary. On the other extreme, you have people who immediately know that their hallucinations aren't real and they're skeptical of them. What is the difference between these two sets of people?

Anton's Syndrome, which I only touch on briefly, does involve all sorts of misconnections from reality testing. But with complex temporal lobe hallucinations, which during surgery can be induced by stimulating the temporal lobe cortex in the right place, can produce what Dr. Penfield, a pioneering neurosurgeon, called "experiential hallucinations," which seem intensely real. Although there may be a sort of doubling of consciousness, so the patient can say, "I know I am in Dr. Penfield's operating room, but I am also at the corner of 25th and First Avenue in South Bend, Indiana."

They might feel an intense sense of similarity in their investing somehow the present. I think one has to think in terms of various levels. These Charles Bonnet hallucinations are relatively low down in the ventral visual pathway. But by the time one comes to these temporal lobe hallucinations, one is finding co-activation of the amygdala and the hippocampal systems. This then may invest them, certainly, with a strong sense of emotion and familiarity. Also, to some extent, of [a sense of] reality.

You also describe—in the temporal lobe epilepsy patients—ecstatic hallucinations.

These so-called "ecstatic" hallucinations have been described for many years in the medical literature, and in the general literature. You have only to read Dostoyevsky's descriptions of his own seizures—descriptions he also splits among many of his characters. He would suddenly be arrested and cry, "God exists! God exists!" He would feel that he was in heaven and that everything was unified and made sense. It could sometimes be followed by convulsions, but he said for five seconds of this state he would give his whole life.

In these ecstatic hallucinations, there is a sudden transport of joy and also a sense of being transported to heaven or into communication with God. These seem intensely real to people and very pleasurable. There was an interesting study a few years ago when there was an attempt to treat some patients with ecstatic seizures. A lot of them refused to take medication, and some of them even found ways of inducing their own seizures.

If a seizure is pleasant, usually there is spiking in the right temporal lobe at the same time as people are having their divine vision. They may be a bit out of touch with the sort of daily reality around them. But lives are being transformed by this.

One of my favorite case histories, which I quote in my book, is of a bus conductor in London who, as he was punching the tickets, suddenly felt that he was in heaven and told this to all of his passengers. He remained

in a very elated state for three days. It sounds as if he was in an almost postictal mania. Then he continued on a more moderate level, deeply religious, until he had another bunch of seizures three years later—and he said that cleared his mind. Now he no longer believes in God and angels, in Christ, in an afterlife, or in heaven. Interestingly, the second conversion to atheism carried the same elated and revelatory quality as the first one to religion.

I want to ask you about a personal experience of mine. I don't think I've ever experienced a full-blown hallucination, at least to my knowledge. But you might remember from the conversation we once had at dinner that I am a grapheme-color synesthete. For our readers who are unfamiliar with the term, it means that I see letters and numbers in color. Is this a hallucination?

No, I think that seeing letters and numbers in color or seeing music in color is really a constant physiological happening between two areas of the cortex, a letter-reading one and a color-constructing one. I think this sort of thing, which you can probably verify from your own experience, comes at an early age, and doesn't change. I suppose one might call it an illusion, in that one sensation is invested with the qualities of another sensation. This can take very complex forms. There's one professional musician who could taste different pitches—she tuned her violin by taste.

That's amazing. For me it just feels so natural, yet I know, intellectually, that the appearance of the color doesn't happen until my brain has somehow understood the symbolic meaning of a letter, for example.

That's interesting. And if you're given a sort of a nonsense string of letters, that doesn't light up at all?

Well, the letters do. But it's not until—say if I see two intersecting lines, it's not until my brain decides whether it's a T or an L that I see the color. If letters are occluded and I don't know what the letter is, there is no color. It feels instantaneous to me that the color comes on in line with the meaning of the letter. In that way, I wondered if there wasn't a part of my brain that is overlaying a hallucination. But I can see your point that it's more of an illusion because it's unchanging and it's always present.

Probably if you spoke to another letter-synesthete, you would find that he or she had different colors from you.

Yes, in fact, I've been working with an illustrator on a graphic novel. Her name is M.G. Lord. She's also a synesthete, and we have very heated arguments about what colors the letters should be.

Nabokov discovered when he was a child that he was a synesthete. But he complained to his mother that the letters in the alphabet set were of the wrong color. She agreed with him. But when she said the colors they were to her, the two of them disagreed. In general, synesthetes don't agree.

This is especially striking for musical synesthetes. Liszt and Rimsky-Korsakov both thought [their musical synesthesia] was something absolute. But when they met they found that they saw very different colors and couldn't agree about anything.

I'd like to wrap up the interview with a more personal note from your own experiences. I was very much struck by one experience you described in which you had taken a hallucinogenic drug and you were waiting for a hallucination to appear. And then nothing happened. Can you describe that experience?

Yes, well, I was living then down on Venice Beach in the early 1960s, and there were a lot of drugs around. And people said to me, if you really want something striking take artane. Artane is a belladonna-like drug which is used in treating Parkinson's. And they said just take twenty, you'll still be in partial control. Anyhow, I took these tablets. At first I noticed nothing. I had a rather dry mouth, difficulty accommodating, and my pupils were dilated. Nothing else. Then I heard a car door slam and footsteps, and I thought it was my friends Jim and Kathy. They often visited me on Sunday. I shouted "Come in!" and we chatted. I was in the kitchen.

There was a swinging door between the kitchen and the sitting room. I said, "How do you like your eggs done?" And we chatted in the four or five minutes while I prepared their ham and eggs. Then I walked out with the breakfast on a tray and . . . there was no one there. I was so shocked I almost dropped the tray. It hadn't occurred to me for a moment that all this was hallucinated, at least that their part of the conversation was hallucinated. I thought I'd better watch myself. But this was followed by some even stranger things, including having a conversation with a spider. I think the spider was real enough; there weren't any visual elements.

But then the spider said, "Hello." And for some reason it didn't surprise me any more than Alice was surprised by the White Rabbit. I said, "Hello yourself." And we had a conversation. Actually, an abstract conversation about some points in analytic philosophy. Many years later, I mentioned this to a friend of mine, an entomologist, the philosophical spider with a voice like Bertrand Russell. He nodded his head and said, "Yes, I know the species."

What is amazing is that you were expecting it. You were waiting for a hallucination.

Yes. Although I didn't think it would take that form. I thought it would be all sorts of dramatic visual misperceptions and hallucinations as one may get with LSD or mescaline and those drugs. But this time it was purely auditory, and oddly humdrum although at the same time deeply absurd. I wonder what one would have thought had they seen me talking learnedly to a spider.

In light of recent debates in our pages about certain political aspects of skepticism, we invited this commentary from a libertarian and skeptic.—EDITOR

Valuing Science with Differing Values: Let's Broaden the Debate in the Skeptical Movement

BARRY FAGIN

What do you do when your heart says one thing and the data says another? When science conflicts with values, which wins the battle for your soul? Which, for that matter, gets your vote?

Skeptics have a particular challenge with science and moral values, because for us science is a moral value. Critical thinking, honest engagement with the evidence, understanding the world as it is, avoiding self-deception, intellectual integrity, these all have moral stature in our lives. We are denied the simple consolations of "science is just a tool," "ethical living is more important than empirical facts," and other outlets of the less critically minded.

These conflicts affect skeptics of all political stripes. Liberal skeptics, for example, may feel some tension between the science of evolutionary psychology and gender differences. How society should respond to the scientific basis for gender difference is a policy question, not a scientific one, but liberals might legitimately worry about how the evolutionary basis for gender differences could be used to hamper their goal of a more egalitarian society.

In this magazine, this conflict has most recently manifested itself with conservative and libertarian skeptics on the issue of global warming. (See, for example, Frazier [2013] and Mooney [2012].) As a longtime libertarian, skeptic, and occasional contributor, I've felt this conflict personally. I accept the scientific consensus that the Earth is warming and that human activity is a significant contributor to it, because, frankly, in light of the evidence, what else can I do? But I understand the upset of readers who were bothered by the Mooney article, most of whom I assume are conservatives or libertarians. We have, I think, two principal concerns.

First, accepting anthropogenic global warming means we will have to accept a larger role for government than we have traditionally been comfortable with. Following Haidt's (2012) terminology, libertarians and conservatives tend to value the moral dimension of liberty more than liberals, who tend to emphasize fairness and proportionality. As the primary institution for establishing the latter at the expense of the former, we take a dim view of government, believing it should be used only for certain narrowly defined functions required to secure the rights of its citizens.

Libertarians understand economics, externalities, and market failure perfectly well. However, we also understand that all institutions are subject to failure, including government. In fact, we believe as skeptics that the evidence shows that even though politics and governmental approach to problems do not work particularly well, they nonetheless expand far beyond their original intent, making things worse and far more difficult to repair. We wish to break that cycle.

Thus we worry, I think with good cause, that any approaches to combat global warming will not be restricted to affecting global climate but will be used to advance a political agenda that we oppose.

After all, what actions could not be justified in the name of saving the planet? Is it really so beyond the pale to think that global efforts to address anthropogenic global warming are at risk

to be hijacked by others with a much more expansive agenda? Is the profound emotional response we get from believing we are saving humanity at risk for affecting our rational judgment?

As a skeptic, I would argue the risk is quite real. This doesn't mean we should reject the science, any more than liberals who aspire to gender equality should reject evolutionary psychology. It simply means that we will have to work for our respective political goals within the context of what the science says to try and prevent "agenda overreach."

This would be easier for conservative and libertarian skeptics to do, I think, if we felt more welcome in the skeptical community. When it comes to politics, I like to think of libertarians as consistent skeptics. We want to know how everything actually works in practice, not how it is merely supposed to work or assumed to work. This includes government.

This is in principle an empirical question. While it is one best suited to the social sciences and therefore not easily settled via controlled experiments, it remains an appropriate one for skeptics to ask and explore.

And yet, while I and others have tried for years to introduce this perspective into the skeptical movement (see, for example, my 1997 article in SI), we have met extraordinary resistance, due to implicit articles of faith within the skeptical movement we would like to respectfully challenge. In all these cases, we don't dispute the science, but we think there is room for a broader debate on policy.

For example, is more government funding for science always a good thing? Equivalently, must cuts in government funding of science always be opposed?

What are the rights of psychics and fortunetellers? Are we as skeptics at risk for violating them when we take certain policy positions?

As of this writing, CSI has a petition submitted to the FDA to regulate homeopathic medicine similar to other drugs. Should skeptics be so sure this is a good idea?

These are just some policy questions on which libertarian and conservative skeptics have different views from their liberal colleagues. Were our views proportionally represented in skeptical writings, on skeptical websites, and at skeptical conferences, I suspect the discussion on policy issues would be more civil, more dispassionate, and healthier for the skeptical movement as a whole.

Perhaps my perception is inaccurate. Perhaps libertarian and conservative skeptical voices would be welcomed if they spoke out more, wrote more, and contributed more to the skeptic community. Or perhaps we make up a smaller fraction of the skeptical movement than my anecdotal experience suggests.[1]

I do not know for sure. It would be interesting to find good data, or perhaps to conduct a rigorous poll that attempts to understand better how skeptics describe themselves politically. Perhaps libertarian and conservative skeptics could be encouraged to take a more proactive role in the skeptical movement, and we could see what happens. In that context, I'd respectfully ask my liberal colleagues to be a little more receptive to the ideas of their non-liberal comrades in arms.

We are all bound to run into situations where science conflicts with our values. When that happens, the best we can do is accept the science, state our values explicitly, and work to achieve the world we want. If you're worried about how the science might be used, work to make sure it's not used that way. If you're concerned about science being used to promote an agenda you oppose, show the evidence and state why you oppose it.

Finally, all skeptics should realize that the political power of science, even when used in ways that threaten our own personal values, is a sign of humanity's progress. It used to be that societies made decisions impacting thousands of lives by casting lots, appealing to revelation, killing animals and examining their entrails, killing humans to appease imaginary beings, and innumerable other appeals to superstition and ignorance. While we continue to fight these same forces in the modern world, it would be both unduly pessimistic and intellectually dishonest to deny the hard-won credibility that science now has.

That ought to be a source of satisfaction to us all. ■

Note

1. At the 2007 Amazing Meeting (TAM 5), one panelist asked libertarians in the audience to self-identify. By my estimate, between 20 and 25 percent of the conference attendees raised their hands.

For Further Reading:

Fagin, Barry. 1997. Skepticism and politics. Skeptical Inquirer 21(3): 40–43. See also Skepticamp 2011 presentation, http://www.youtube.com/watch?v=BJhSKOfcz9c.

Frazier, Kendrick. 2013. Can we have civilized conversations about touchy science policy issues? Skeptical Inquirer 37(1): 4, 25.

Haidt, Jonathan. 2012. *The Righteous Mind: Why Good People Are Divided by Politics and Religion*. Pantheon Books.

Mooney, Chris. 2012. Why the GOP distrusts science. Skeptical Inquirer 36(4): 8–11. (Letters in reaction, SI, January/February 2013, 37(1): 64–65.)

"Petition Seeks Review of Homeopathic Drugs." 2011. On CSI website at http://www.csicop.org/news/press_releases/show/petition_seeks_fda_review_of_homeopathic_drugs.

The Skeptical Libertarian: http://www.skeptical-libertarian.com/.

Barry Fagin is professor of computer science at the U.S. Air Force Academy in Colorado Springs. The views represented here are his alone. He is an ACLU National Civil Liberties Award Recipient and a syndicated newspaper columnist who writes frequently about skepticism and critical thinking. In 2012, he was named the Colorado Professor of the Year by the Council for the Advancement and Support of Education. Readers can contact Dr. Fagin at barry@faginfamily.net.

Recent Miracles You May Have Missed

LAWRENCE RIFKIN

Resurrection

In January 2000, a subspecies of wild mountain goat called the Pyrenean ibex became extinct. Its last living member was crushed to death by a fallen tree, and that was the end of the species forever. Officially and totally extinct.

A skin scraping from the last surviving mountain goat's ear was stored in liquid nitrogen. The nucleus of one of the cells was transferred into an egg of a domestic goat and implanted into a domestic goat surrogate mother. A Pyrenean ibex mountain goat—previously extinct—was brought back to life and born five months later. Although the baby goat did not live long, it was the first animal in history to be resurrected from extinction.

Cloning, in a sense, brings an organism back from the dead. Dolly the sheep is well known, but less well known is that more than twenty types of animals have been successfully cloned at this point, including cat, dog, horse, pig, rabbit, water buffalo, and monkey.

The Ten Plagues

Smallpox. Diphtheria. Rheumatic fever. Bubonic plague. Polio. Measles. Scurvy. Tuberculosis. Death from childbirth. Infant mortality.

I recommend that the recitation of the Ten Plagues during Passover seders be changed to this new list, as a truer modern example of natural horrors and what we can be thankful to scientific human progress for eliminating or abating.

Once a destroyer of millions, altering events in history, these ten afflictions have plagued humans throughout our past—until recently. In developed countries, these conditions are rarely seen anymore. Not eliminated, certainly, but not the curse of years past. Why? Because of immunizations, antibiotics, nutrition, and public health measures. Of course, many of these afflictions still kill in developing countries and among certain populations. So the battle is not yet won. But we can still give thanks for progress and continue the fight, with evidence-based tactics rather than superstition.

Transubstantiation

The substance of bacteria and algae are being changed, through synthetic biology, into the substance of medications, fibers, plastics, and renewable biofuels. This transubstantiation occurs by technologically engineering genes so that microbes produce new metabolites that then can be used, either directly or indirectly, to produce new products that benefit humankind. An engineered species of yeast can now produce artemisinin, an anti-malarial medication, and several companies are now using engineered microorganisms to produce 100 percent microbe-derived renewable fuel.

Parting of the Sea (of Stars)

We've known for decades that the universe is expanding. But we now know that the rate of the expansion is *accelerating*! There are hundreds of billions of galaxies in the known universe, many with over a hundred billion stars each, and all of these galaxies are not only expanding farther and farther away from one another, but the rate of the expansion is getting faster and faster. After the initial discovery of the acceleration, made by independent researchers analyzing the red shifts of distant supernova in 1998, this great "parting of the sea of galaxies" was corroborated by multiple other sources, including measurements of the cosmic microwave background radiation, large-scale cosmic structure, and properties of galaxy clusters. The source of this acceleration, known as dark energy, is largely a mystery at this point.

* * *

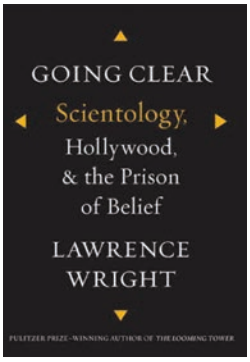
What a privilege to be living through a time of such miracles. These are not literal miracles, of course, in the sense of divine intervention, and so *miracles* is not the correct word. The "miracles" of science and technology are more appropriately and clearly described as wonders—a result of human imagination and curiosity linked to a *naturalistic* method of knowing and learning about our *naturalistic* world. The amazing results have changed our lives and our understanding of who we are. And its findings are backed by evidence and reproducibility.

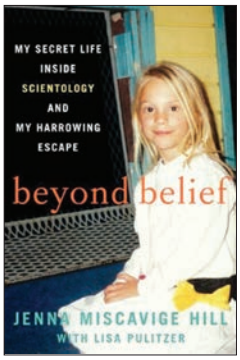
"I'd take the awe of understanding over the awe of ignorance any day," wrote Douglas Adams. The fruits of such modern wonders provide unimaginable power to ease misery, advance knowledge, and allow for the flourishing of human potential. It's called science. It's called critical thinking. Its power and potential blessings—if used wisely—are unparalleled. ■

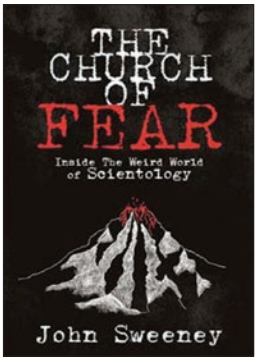
Lawrence Rifkin is a physician and a writer, with publications in *Free Inquiry*, *The Humanist*, *Contemporary Pediatrics*, and the *National Academy of Sciences*. He was the grand prize winner of the Doctors' Writing Contest sponsored by *Medical Economics*.

Clear and Fear: Scientology Under Review

WENDY M. GROSSMAN







Going Clear: Scientology, Hollywood, and the Prison of Belief
By Lawrence Wright. Alfred A. Knopf, New York, 2013.
ISBN: 978-0-307-70066-7. 432 pp. Hardcover, $28.95.

Beyond Belief: My Secret Life Inside Scientology and My Harrowing Escape
By Jenna Miscavige Hill with Lisa Pulitzer. William Morrow, New York, 2013.
ISBN: 978-0-06-224847-3. 404 pp. Hardcover, $27.99.

The Church of Fear: Inside the Weird World of Scientology
By John Sweeney. Silvertail Books (www.silvertailbooks.com), 2013.
ISBN: 978-1-909269-03-3. 324 pp. Paperback, £12.99.

We very likely have Katie Holmes to thank for the timing of this latest crop of books on Scientology, the belief system so notably promoted by her ex-husband, Tom Cruise. Yes, at least two of these authors have been researching their books for many years, but for promotional opportunities you can't beat a good celebrity crack-up. That said, the Church of Scientology's known love of litigation and the United Kingdom's libel laws have made British publishers skittish: Transworld canceled *New Yorker* staff writer Lawrence Wright's *Going Clear*, and BBC investigative journalist John Sweeney's agent, turned down by every major British publisher, created a new independent publishing company to get *The Church of Fear* into the marketplace.

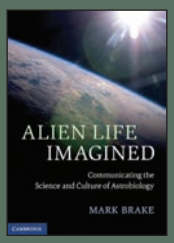
Wright's frame for *Going Clear* is the personal story of Hollywood screenwriter Paul Haggis (*Crash*, *Million-Dollar Baby*), which ran in the *New Yorker* in 2011. A good choice: Haggis found Scientology as an alienated twenty-one-year-old in London, Ontario, in 1975 and stayed with it through his waxing and waning career. He didn't begin asking questions until 2008, when the Church's name appeared on a list of organizations supporting Proposition 8, the California ballot initiative to ban gay marriage. When Haggis, two of whose daughters are gay, failed to get satisfactory answers about the issue, he began researching the Church he thought he knew. What he learned led to his resignation. He tells Wright: "I was in a cult for thirty-four years. Everyone else could see it. I don't know why I couldn't."

All told, Wright interviewed more than two hundred current and former Scientologists in addition to research in archives and on the Internet. The effort shows. If you haven't been following the progression of books and articles over the last thirty years, this is as complete and rounded an account of Scientology and its people as you're likely to find—now or in the future. Wright notes that for years the Church has been buying up original Hubbard-related journals, letters, and photographs and withdrawing them from public view.

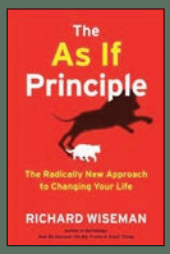
If you have been following the Church, however, it's surprising how much of the book's material is familiar. Most of the details of the life and lies of Scientology founder and pulp-fiction writer L. Ron Hubbard were laid bare in two 1987 books, British journalist Russell L. Miller's *Bare-Faced Messiah* and American former Scientologist Bent Corydon's *Messiah or Madman?*. In *Time*'s "The Thriving Cult of Greed and Power" (1991), Richard Behar took a hard look at the Church's operation and finances. *Vanity Fair*'s Maureen Orth published a close-up look at Tom Cruise's love life just prior to Holmes, showing the Church's micromanagement of everything its biggest celebrity spokesman might want. Finally, in 2011's *Inside Scientology: The Story of America's Most Secretive Religion*, Janet Reitman broke new ground by studying the transfer of power within the Church after Hubbard died—pardon me, "discarded his body"—to current leader David Miscavige, uncovering the level of torture and abuse endured by members of Scientology's elite "Sea Org," and taking

[NEW AND NOTABLE

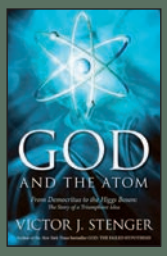
Listing does not preclude future review.



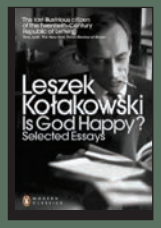
ALIEN LIFE IMAGINED: Communicating the Science and Culture of Astrobiology. Mark Brake. Astrobiologist and science communicator Brake takes readers on a fascinating sociocultural survey of how extraterrestrial life has been depicted over the centuries in film, fiction, science fiction, religion, and elsewhere. Of particular interest to students and scholars of the folklore of aliens and the search for extraterrestrial life. Cambridge University Press, 2013, 288 pp., $45.00.



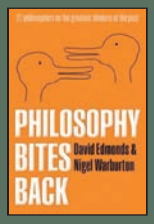
THE AS IF PRINCIPLE: The Radically New Approach to Changing Your Life. Richard Wiseman. The holder of Britain's only professorship in the Public Understanding of Psychology turns traditional self-help books on their head by emphasizing William James's principle, "If you want a quality, act as if you already had it." Using firsthand experiments, case histories, and psychological case studies, Wiseman illustrates how we can apply the principle to our lives. Free Press, 2013, 285 pp., $25.00.



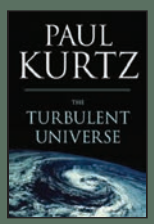
GOD AND THE ATOM: From Democritus to the Higgs Boson: The Story of a Triumphant Idea. Victor J. Stenger. Physicist Stenger, author of *God: The Failed Hypothesis*, here chronicles "one of the most successful scientific hypotheses ever devised," the concept of the atom, from the earliest atomists to the latest discoveries of physics. This exploration of the science underscores his main point: the total absence of empirical facts and theoretical arguments for the existence of any component to reality other than atoms. Prometheus Books, 2013, 300 pp., $25.00.



IS GOD HAPPY? Selected Essays. Leszek Kolakowski. One of the eminent figures in the world of ideas, philosopher and thinker Kolakowski (1927–2009) presents essays, some published here in English for the first time, that range over an array of themes that characterized his lifetime of work: political ideologies; religion, god, and the problem of evil; modernity, truth, and the past ("and some other things"). His work features a critical skepticism and suspicion of claims, combined with a strong rejection of relativism and a defense of the idea of truth. Basic Books, 2013, 340 pp., $28.99.



PHILOSOPHY BITES BACK: 27 Philosophers on the Greatest Thinkers of the Past. David Edmonds and Nigel Warburton. The authors, who created a series of short podcast interviews with famous thinkers and philosophers, have released their second compilation of interviews (the first was titled *Philosophy Bites*). Though the topics are not necessarily related to skepticism (love, truth, religion, forgiveness, etc.), readers may enjoy the lively and engaging style. Oxford University Press, 2013, 288 pp., $16.95.



THE TURBULENT UNIVERSE. Paul Kurtz. In his final book, philosopher Paul Kurtz, founder of the Committee for Skeptical Inquiry, the Council for Secular Humanism, and the Center for Inquiry, outlines his personal vision of a new planetary ethics inspired by scientific wisdom. He interprets recent scientific knowledge of the universe—its beauty and elegance but also a place where contingency, chance, dissonance, emergence, and novelty are at work—and extols the method by which we have learned about it—scientific naturalism. He sees that humans capable of moral choices are engaged in a human adventure whose outcome depends on how we respond to that new understanding. Prometheus Books, 2013, 310 pp., $20.00.

a first look at the stories of kids who've grown up in Scientology.

Elements of all these prior works are visible in Wright's account, which pulls them together and fills in missing detail and personal context. The material less familiar to me included Hubbard's "Affirmations," a thirty-page diary of sorts that the Church calls a forgery but that was introduced as an exhibit in the Church's 1984 lawsuit against its former archivist, Gerald Armstrong. In it, Hubbard wrote candidly about himself and his fears that Wright believes are an early attempt at using the methods later known as Dianetics, Scientology's precursor and foundation.

"I was in a cult for thirty-four years. Everyone else could see it. I don't know why I couldn't."
—Screenwriter Paul Haggis

Wright has also done a good job on the Church's finances. Its extreme wealth derives in part from the 1993 settlement with the Internal Revenue Service that classed it as a tax-exempt religion. Hubbard stopped paying tax in 1973; by 1991 the Church owed $1 billion in back taxes and had brought more than 2,300 suits against the IRS on behalf of individual Scientologists and two hundred of its own. The two organizations went all out spying on each other until, in 1991, Miscavige, by then installed as leader, abruptly called on the commissioner and proposed détente. The settlement took two years to negotiate; the Church eventually paid $12.5 million in back taxes and dropped all its lawsuits. The kicker: if they had paid the full sum in 1991 the Church by now might be just a historical oddity. Instead, it has $1 billion in assets,

mostly held in offshore accounts, despite declining membership according to polls and census figures.

"Public" Scientologists—that is, those who live and work outside the Church and simply take courses or use "the tech"—almost certainly have little idea how the Church treats those who give their lives to it by becoming members of the inner-circle "Sea Org." They are told to avoid the media and are offered Internet filtering software to block anti-Scientology sites that might tell them that anyone, from highly visible spokespeople to children, may abruptly disappear for months or years of punishment where their basic biological needs are barely met and they are forced to do hard physical labor at exploitive or nonexistent rates of pay. Even more protected from the reality of this side of the Church are its celebrity spokespeople; their experiences of Scientology are limited to its beautifully appointed Celebrity Centers.

Where Wright's book is at its best is in the personal stories: Haggis's, of course, but many others, including that of Spanky Taylor. For a time she was John Travolta's trusted personal Church liaison until she was abruptly sent away for punishment and finally left the Church. It can happen to anyone: even Church president Heber Jentzsch, a frequent public spokesman in the 1990s, has been in "the Hole," whose tortures are vividly described to Wright, since 2006.

This decade's significant change in how we think about Scientologists—as opposed to Scientology—has to be this: a substantial portion of today's Scientologists did not choose to join. Instead, as Miscavige's niece, Jenna Miscavige Hill, recounts in *Beyond Belief*, their involvement is a result of decisions made by their parents or grandparents. Hill's parents, like Miscavige himself, were brought into Scientology as children; she knew she was a Thetan as soon as she could talk. She was two when her parents abandoned family life in New Hampshire and committed their lives entirely to the Church. Hill grew up with other Scientology kids in a rigidly controlled, isolated environment on a ranch in Southern California, rarely seeing her parents and schooled primarily in Hubbard's writings. One day, with the other kids, she signed a billion-year contract with the Sea Org. She was eight.

A billion years, thirty years—it's all the same when you're eight, but as Hill grew older she began to realize what she'd given away: her individuality, the right to ask questions, the right to family life. You can rationalize that, as well as punishments such as isolation and scrubbing bathrooms with a toothbrush, as long as you believe it's to benefit the greater good. The Miscavige name subjected her to additional pressure and scrutiny as well as resentment from those who thought it gained her special privileges. In her mid-teens, Hill underwent months of "sec-checks" intended to force her to find and confess "withholds" from her present and past lives, and couldn't understand why. Eventually she was told: her parents had left the Sea Org. Expected to go with them, she was being given the standard leaving treatment; the Church was collecting secrets it could use to silence her later.

She didn't want to leave, not then. That came later, after she met and fell in love with Dallas Hill. After many struggles, internal and external, the pair "blew" for the real world. Hill has gone on to have the children she wouldn't have been allowed inside the Sea Org and cofound the ExScientologyKids website. Gradually, she came to realize the extent to which her life had been owned by the Church. In 2007, when the high-ranking Mike Rinder blew, she finally learned the inside story of why and how her life had been micromanaged at the behest of her uncle.

Rinder's high-profile defection, one of several over the past five or six years, came after his appearance as a Church spokesman in the documentary *Scientology and Me*, a 2007 episode of the BBC's *Panorama*, a program with roughly the national weight and reach of *60 Minutes*. The award-winning investigative reporter behind it, John Sweeney, followed up in 2010 with *The Secrets of Scientology*. Despite his long history as a war correspondent, Sweeney says his life's most frightening moments came while investigating Scientology. This is the story he tells in *The Church of Fear*; it's the stuff they didn't broadcast, including detailed accounts of interviews with the actresses Anne Archer, Leah Remini, Juliette Lewis, and Kirstie Alley, all celebrity supporters. For me, it contains the most new and original (and entertaining) material of the three books reviewed here. Sweeney even visited Trementina, the "space alien cathedral" miles out in the New Mexico desert that stores all of Hubbard's work on gold-plated discs in a heavily protected underground vault. Also in the book are leaked BlackBerry messages between Miscavige, Rinder, Davis, and other handlers showing that Sweeney's developing paranoia that he was being spied on was entirely justified.

Hill's parents, like Miscavige himself, were brought into Scientology as children; she knew she was a Thetan as soon as she could talk.

Sweeney has apologized many times for "the exploding tomato" incident:

the moment in 2007, widely viewed on YouTube, when he turned bright red and started bellowing at Church spokesman Tommy Davis, Anne Archer's son. By 2010, enough of Sweeney's 2007 handlers had defected that he could put them on the air to explain exactly how he was goaded and manipulated following Hubbard's strategy of pushing the enemy until he does things you can use to discredit him. However, this strategy collided with the strategy devised by Sweeney's producer, Sarah Mole, which cast Sweeney as the hypothetical goat in *Jurassic Park*: bait to pull the predators into the open. A few days before the 2007 broadcast, the Church published the clip of his explosion, following later with a counter-documentary, *Panorama Exposed*. As an effort to discredit, it failed: the license fee-paying British public was inclined to view the tomato incident as an understandable lapse.

It was the pressure of lying in response to Sweeney's knowledgeable point-blank questions that led to the defection of Mike Rinder, who had been pulled out of the Hole to handle Sweeney. The question that broke his back: Had David Miscavige ever hit him? In 2007, Rinder said no. In 2010, a much happier Rinder said instead that the culture of violence in the Church starts at the top and spreads outward and estimated he'd personally been beaten by Miscavige fifty times. Wright lists twelve people who say they, too, were victims of assault by Miscavige and twenty-one who say they witnessed such incidents.

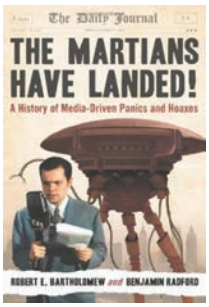
The Church repeatedly has denied these and the other claims of violence, abuse, and deception that all three of these writers and many others continue to spread across the media, backed up by the many Internet sites that are enabling disaffected former Scientologists to find each other and share their stories. Church spokespeople have called critics, even Scientology's own blown former top spokesmen, criminals, sex offenders, bigots, liars, suppressive persons, evil, and psychopaths. Midway through Sweeney's book, as the number of such characterizations multiplies, it becomes impossible not to think of the actor's agent George Fields (Sydney Pollack) in the 1982 movie *Tootsie*, explaining reality to his brilliant but unemployable client, Michael Dorsey (Dustin Hoffman): "They can't all be idiots, Michael. You argue with *everybody*." ■

Wendy M. Grossman is the founder and former editor (twice) of *The Skeptic* (U.K.) and a Committee for Skeptical Inquiry Fellow. She wrote about Scientology's early battles with the Internet for *Wired* in 1995. Her writings can be found at www.pelicancrossing.net and on Twitter at @wendyg.

No News Is Good News, but Bad News Is Deadly

KITTY MERVINE

> "Under certain conditions men respond as powerfully to fiction as they do to realities, and in many cases they help to create the very fictions to which they respond."
>
> —Walter Lippman (quoted in *The Martians Have Landed!*)


The Daily Journal
THE MARTIANS HAVE LANDED!
A History of Media-Driven Panics and Hoaxes
ROBERT E. BARTHOLOMEW and BENJAMIN RADFORD

The Martians Have Landed!: A History of Media-Driven Panics and Hoaxes.
By Robert E. Bartholomew and Benjamin Radford.
MacFarland, Jefferson, North Carolina, 2012.
ISBN: 0786464984. 254 pp. Softcover $40.00.

Robert E. Bartholomew and Benjamin Radford's book *The Martians Have Landed!: A History of Media-Driven Panics and Hoaxes* chronicles the long history of how the media fabricates and exaggerates to attract the public.

Each chapter highlights a media hoax or exaggeration, from conception to often tragic conclusion. The hoaxes are from newspaper, radio, television, and the Internet. The book starts out with one of the most famous hoaxes of all time, the 1938 Mercury Theater radio broadcast of *The War of the Worlds*. Orson Welles, the twenty-three-year-old producer of the program, pulled off a hoax that is still the envy of any young Internet hoaxer today. The problem highlighted in the book is that these hoaxes have consequences, often unforeseen by the hoaxers themselves. Welles was surprised by the intensity of the response to his very realistic portrayal of a Martian Invasion of New Jersey.

The book covers newspaper hoaxes, including the 1835 *New York Sun* newspaper moon hoax. The paper was successful at boosting readership by an elaborate hoax that involved using the name of the famous astronomer, Sir John Herschel. The paper detailed the discovery of life on the moon, including flying bat men, as seen by Herschel. Even after the hoax was uncovered, the readership at the paper stayed higher, proving there are often few penalties for the hoaxer.

The book follows through to present day Internet hoaxes, and ends with a chilling chapter about the dangers of vaccination scares written by physician Felicity Goodyear-Smith and Helen Petrousis-Harris. Each chapter highlights the long legacy of how easily the media can influence public emotions, opinions, and actions with fictitious or poorly researched reporting.

People like to assume that they cannot be fooled by media hoaxes and exaggerations, but Chapter 10 covers media myths about the Hurricane Katrina survivors. I admit to commenting among friends that I felt the survivors of Hurricane Sandy were not behaving far better than the survivors of Hurricane Katrina had. To my shame, I discovered while reading that the poor behavior reported was a myth made up by a media unable to get to where many of the survivors were sheltered. The difference between the behavior reported and the actual behavior was not because of how survivors behaved, but more likely because Hurricane Sandy hit the New York area, a major news center. Reporters had easier access to the areas hit by Hurricane Sandy, so they were able to file more accurate reports. The lesson is that the media, rather than wait for facts, will report rumor in the rush to get news out quickly and have high ratings. The bad behavior during Katrina was by the media with its exaggerations and sloppy reporting, not the survivors.

The book is also very lighthearted at times. Modern doomsday preppers, of reality TV show fame, come to mind when reading about the Halley's Comet panic of 1910. Some of the public, fed by media reports, believed the trail of the comet would poison the air. France limited the buying of oxygen, as so many people had bought tanks of oxygen for the impending crisis fueled by the media. Over and over the book shows how when it comes to hoaxes, media reporting, and public reaction, things haven't changed.

The most important lesson in the book is how truly dangerous these hoaxes can be. The book details how hoaxes have led to deaths, false imprisonments, and many wasted resources. When the police have to invest time and money looking for clown kidnappers, mad gassers, and organ thieves, they have less time and money to spend dealing with real crime and safety issues. The focus on ratings, and the lack of real investigative work by reporters, puts us all in danger. The reporting of imaginary risks keeps us from focusing on real dangers in our lives.

The most important lesson in the book is how truly dangerous these hoaxes can be. The book details how hoaxes have led to deaths, false imprisonments, and many wasted resources.

Fear of cell phones giving us brain cancer takes attention away from the very real dangers of driving while texting or talking on a cell phone. Parents spend time checking Halloween candy for needles, razors, and poison, despite the fact that no child has ever been killed by a stranger via Halloween candy. The real dangers of trick or treating—walking along dark streets with traffic or flammable costumes near candles—are ignored by the media while yet again the local hospital offers to x-ray all candy.

The book also covers the fear of child predators and sex offenders during Halloween. Despite the complete lack of evidence these people pose any more of a danger to children on Halloween. The media scare leads the community to provide protection for a danger that does not exist. The media is guilty of creating a danger that does not exist at all.

Other hoaxes covered include a cursed painting of a crying boy that brings disaster to those that hang it on their walls. Chupacabras, sharks, organ snatchers, and clowns also are covered. Perhaps the timeliest chapter covers school shootings, which covers the odds of a child being killed at school by a stranger versus being killed at home by someone he or she knows.

The book is at times amusing and at times frustrating as you marvel at the immense power of a few in the media to influence so many of their audience. The book is also humbling at times, as when I learned I had fallen for several of the hoaxes mentioned.

The book does a wonderful job of showcasing just a few of the countless times the media has abused the trust of the public. When the mainstream media is no longer to be trusted, where do people go to find good information? That is perhaps the most troubling question that will be left after reading this book.

If you are looking for a book that will amuse and hold the interest of your more credulous colleagues, I highly recommend you purchase this book. Chapter after chapter has a lesson to be learned. The story of each hoax is so interesting that the book will hold the interest of the non-skeptic as well as the skeptic.

The Martians Have Landed! is an important resource for any skeptic's library and an entertaining read for anyone. The role of the skeptic, to take the time to check and often do the research reporters should be doing, is more important than ever with the incredible growth of the presence of the media in our lives. ■

Kitty Mervine is the author of two skeptic books for children, including *Fairy Tales, Fairly Told*. She serves as resident skeptic for a local Bigfoot hunting group and speaks on a variety of topics, including her work with people suffering from the belief that they have been abducted by aliens. Mervine is also Head of Investigations for the Granite State Skeptics. She blogs at Yankeeskeptic.com.

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Daniel DENNETT
James ALCOCK
Kendrick FRAZIER
Michael SHERMER
Steven NOVELLA
...and many others

Elegy for Paul Kurtz

Though your latest issue on Paul Kurtz featured a good number of appropriate tributes that did justice to the man and his lasting accomplishments (SI, January/February 2013), by far the best of the lot was the poem, "Book of Seasons: An Elegy, for Paul Kurtz," by Joe Nickell. Wonderful!

Tom Parks
Midland, Texas

I missed the *New York Times* obituary and am just catching up with Paul Kurtz's death, memorialized in your January/February issue. In reading the tributes I realized that there was one attribute of Kurtz that had not been mentioned. Which is that he actually liked women and was willing to talk to them. This is a rarer trait than one might think. I'm eighty-six years old, a Yale Law graduate, and I would say perhaps 10 percent of the men I have met fall into this category—one I am not sure my husband belonged in. The syndrome is marked by the man looking you in the eye and actually listening to what you are saying.

Sorry to bring this up but I believe CSICOP has had a bit of a gender problem in the past, and I think this outstanding trait of our founder should be memorialized.

Elizabeth Ehrenfeld
New York, New York

On J. Allen Hynek

On a long commercial flight to Tokyo in the late 1970s, my seatmate was J. Allen Hynek ("The Secret Life of J. Allen Hynek," SI, January/February 2013), on his way to a TV gig. We had ten or twelve hours together to discuss his favorite subject—UFOs. I told him I was an engineering test pilot and a secular humanist, which was apparently a challenge to him.

He had a satchel full of case files and was only too eager to show them to me and try to convince me that the cases that could not be explained by known science and natural phenomena indicated something akin to paranormal activity was taking place. When I kept resisting his "proof" and asked for the evidence or questioned his witnesses, he got on his soapbox like a country preacher trying to convince me about miracles. He became frustrated, either with me or himself, for I think he knew he was on a wild goose chase and it was eating at him. He was beyond the point of no return and had his reputation on the table for scientific critics. Confirmation bias got to him big time. On the other hand, he had a nice little cottage industry going with lecture fees from the gullible—not a bad retirement plan, for there are lots of gullibles.

Stan Grayson
Dripping Springs, Texas

Righteous Indignation, Scientists Too?

Gary Longsine and Peter Boghossian ("Indignation Is Not Righteous," SI, January/February 2013) described appeals to righteous indignation and to sanctity as failures in reasoning that can insulate an entire culture from self-reflection. They note that "There exists no non-ideological reason why any given idea or belief should be placed beyond contemplation, discussion, investigation, or criticism." These appeals deflect criticism of an idea by claiming that the idea is beyond question. The authors highlighted examples of these appeals by religious adherents but noted that these logical fallacies are pervasive throughout humanity—and unfortunately that sometimes includes scientists.

A recent example is the personal attack on Daryl Bem, a respected psychologist, for publishing research suggesting precognition in a mainstream journal. Certainly, some critiques of Bem's work, such as James Alcock's in SI (March/April 2011), raised legitimate issues regarding methodology and statistics. But among the discussion-stopping appeals to righteous indignation and sanctity published in *The New York Times* were Douglas Hofstadter's call for "a common sense cutoff for craziness," Ray Hyman's assertion that it is "craziness, pure craziness," David Helfand's equating Bem's work to the Pastafarian Flying Spaghetti Monster, Lawrence Krauss's hope that this research "gets happily buried in the dustbin of history," and Anthony Gottlieb's proclamation that "Even if Daryl Bem's study [is] gold-standard science . . . one can still be confident that its findings are incorrect." Such appeals reflect scientism, not science.

Bruce Greyson, MD
Carlson Professor of Psychiatry & Neurobehavioral Sciences
University of Virginia
Charlottesville, Virginia

It has nothing to do with "righteous indignation," but see the March/April SI News and Comment section for our report on a scholarly but strong critique of Bem's work published in the same psychology journal that published his paper.—EDITOR

I was appalled at "Indignation is Not Righteous" by Gary Longsine and Peter Boghossian. Nowhere in the article is an example of a fallacious argument. False beliefs, attitudes you disapprove of, and behaviors you find abhorrent are not fallacies in the relevant sense. Reactions to perceived blasphemy are surely matters of *mores*—like duels or gang wars as a reaction to disrespect—rather than "appeals to sanctity." The view that everyone ought to respect the symbols of your religion may be irrational or at least nonrational, but it is not a

fallacy in the relevant sense. Nor is the consternation felt by some Americans over the burning of the U.S. flag fallacious—though measures taken against the action in the U.S. may be inconsistent with other principles.

Stephanie K. Eller
Arlington, Virginia

I appreciate very much your coining of "Appeal to righteous indignation" and "Appeal to sanctity." Unfortunately, your authors' Latin is very wrong. It should read *"argumentum ad probam indignationem"* viz. *"argumentum ad sanctimoniam."*

If you happened to be using Peano's artificial simplified Latin (http://en.wikipedia.org/wiki/Latino_sine_flexione), disregard my correction, though I still think you oversimplified it.

Chris Impens
chris.impens@telenet.be

Beowulf No Reptile

Although I am a scientist by training, I began studying Old English (OE) after I retired. Among the courses I have taken is the *Beowulf* Translation Seminar given by Dr. Helen Damico at the University of New Mexico. Dr. Damico is a *Beowulf* scholar; she wrote the foreword to the most recent edition of Klaeber's *Beowulf* (Falk, Bjork, and Niles, eds. 2008). I am currently part of a group translating another Old English epic, the so-called *Genesis A*. Naturally, I took a keen interest in Dr. Eve Siebert's article ("Monsters, Dragons, and Dinosaurs, Oh My: Creationist Interpretations of Beowulf," SI, January/February 2013).

As Dr. Siebert notes, Cooper's claim that the language in *Beowulf* is "unambiguous" is poppycock. *Beowulf* is full of kennings and wordplay. A good example is a passage that contains a double-entendre based on the similarity of *burnan* (Mod. Eng. "burn" meaning a stream or creek) and *bærnen* (Mod. Eng. "to burn"). In the poem, a stream flowed out of the entrance to the dragon's den, and "from the burn's [waters] was a flood of hot deadly fire" (ll. 2546b-2547a; my literal translation). The "burn" consists of water and the "flood" consists of fire—more wordplay. All packed into two short half-lines with perfect meter and alliteration! This sort of poetry is neither unambiguous nor unsophisticated.

I offer below additional textual evidence that Grendel and his mother were not dinosaurs. I have relied mainly on Chickering's reasonably literal dual-language translation (Anchor Books, 1977) and my own class notes. I also consulted Bosworth-Toller's Anglo-Saxon Dictionary and the glossary of Klaeber's *Beowulf* (University of Toronto Press, 2008).

• Grendel is explicitly described as having hair ("Then Grendel's head was dragged by its hair across the floor" ll.1647-1648a). The word used for "hair" is *feaxe* (dat. sing. of *feax*); it has no other translation. Reptiles do not have hair.

• When Beowulf enters Grendel's mother's home, he sees firelight (ll. 1516b-1517); she attacks him with a knife (ll. 1545b-1546a); swords and other armaments are hanging about (line 1557). Wild animals don't use fire or forged weaponry.

• Grendel's mother is twice referred to as an *ides* (ll. 1259 and 1351). This rather special word is related to Old Saxon and Old High German terms for semi-divine female beings such as the Valkyrie. It is used only in Old English poetry and always means a woman, usually one of noble birth (a lady). Hrothgar's queen is called an *ides*, as are biblical personages such as Eve and Sarah in other OE works. Grendel's mother also is compared to an armed woman (*wig-gryre wifes*; literally, war-power of women; line 1284). She is more like a warrior princess (albeit an ugly one) than a wild animal.

• In addition to the numerous descriptive terms for the dragon noted out by Dr. Siebert, other reptile-related terms are applied to it. Its hide is scaly; it has poisoned fangs. In both instances a form of the word *ban* is used. The word is cognate with Modern English "bone" and usually is so translated, but it also may mean a bony body part such as scales or a tooth.

Collectively, these and other passages indicate that the poet conceived of Grendel and his mother as sentient beings that had the appearance of large humans and no reptilian attributes. This additional evidence reinforces Dr. Siebert's contention that Cooper's argument cannot be supported by a close reading of the poem itself.

K. S. Neuhauser
Los Ranchos, New Mexico

'Then a Miracle Occurs'?

Marvin Mueller, in "The Higgs Boson and the Future of Physics" (SI, November/December 2012), masterfully reviews the "incredible success in explaining the world in non-supernatural terms." That success has confirmed me as a secular humanist. However, I find that a supernatural input is necessary for the following reason. If the present universe started as a big bang, there had to have been an infinity of big collapses and bangs beforehand, or perhaps a steady-state condition. Energy and mass could be conserved during and between such huge changes. Availability, or "available energy," could not. The principal obvious example of the multiple irreversibilities is the radiation of heat from extremely hot bodies—stars—to colder bodies and to very cold space, highly non-isentropic processes. After an infinity of universes we should all now exist as an uninteresting cool soup, but we do not. Something must happen to break the second law of thermodynamics. That something could be called God. We need a skeptical inquiry into this disturbing question, to which I see no explanation.

David Gordon Wilson
Professor of mechanical engineering, emeritus (and former lecturer in thermodynamics)
Massachusetts Institute of Technology
Cambridge, Massachusetts

Marvin M. Mueller responds:

I'm unable to agree with the thesis proffered by Prof. Wilson because of the presuppositions on which it rests.

The issue of ultimate origin he raises is one of the oldest in all of formal philosophy, but intensive interest in it has reawakened in the last few years—probably because of the new cosmological ways of looking at the universe/multiverse. There's no way I can discuss these matters here for two compelling reasons: lack of space and lack of expertise. However, there's a rich literature of recent works out there for those interested. (The must-read of them all is Michael Shermer's three-page summary of the current status quo presenting twelve recent cosmological arguments, Skeptic *magazine 17(3) 2012; www.skeptic.com.)*

Moreover, and contrary to the opinions of some well-known physicists, philosophy has not proved to be nearly as useless as it seems to them. They are just too provincial in temporal outlook; the mills of philosophy grind too slowly for the impatient.

One of the philosophical things we have learned beyond rational dispute is that the introduction of the supernatural into a rational discussion accomplishes nothing apart from making it possible for most people to feel better about themselves as well as the world as they see it. The five compelling reasons for this are: (1) Absolutely anything and everything (even

including the very basics such as Newton's Laws) can always be explained supernaturally—and so easily that even an imaginative child can do it. (2) This perfect explanatory power of the supernatural is, however, also its perfect Achilles's heel—it cannot be shown by testing to be either right or wrong. In consequence, science and the supernatural cannot coexist within the same explanatory framework: the latter will spread like a virus if it is allowed entry, even once. (3) The employment of supernatural explanations also precludes the possibility of predictability, the ultimate test of useful scientific explanation. Beyond its desirability for emotional reasons, a supernatural explanation is not practically useful—and is certainly not heuristic. (4) Something could be supernatural only if it is known with certainty to be not natural, which puts quite a demand on human knowledge of the world! (5) In all of recorded human history, no solid evidence (in the legal and scientific senses) has surfaced for the existence or occurrence of anything supernatural.

As to Prof. Wilson's specific argument involving the claim that an infinitely recurring sequence of "big bangs" would violate the second law of thermodynamics and that this would require supernatural intervention, space does not allow detailed refutation here, but such may not be necessary in light of the paragraph above. I'll just say that such an argument relies on many presumptions, none of which is self-evident.

Let me end by mentioning what I see as the core problem in all discussions of this type involving the ultimate questions. As I see things, the two biggest of these are ultimate origins (of everything) and how the brain is able to make a mind. For me, the most central and deepest philosophical question is how can three pounds of meat (okay, uniquely well-organized meat) possibly do realistic philosophy, especially when its extremely limited sensory input is taken into account?

Why do most thinkers presume that we will eventually be able to fully understand ourselves and the universe? Perhaps the ultimate answers will always be beyond us. Of course, the saving factor may well be that no one can say what the "us" may eventually become with the help of real artificial intelligence—probably running on quantum computers. In the longer view, maybe the three pounds of meat (the natural us) will become history as far as intellectual enterprises are concerned. Perhaps the natural homo sapiens *will then be content to just live out their lives just the way evolution "intended": food, power, reproduction, and the joy of being. (Here's hoping our biological descendants will not be kept in zoos—at least not in small ones!)*

Meanwhile, what is clear at this time is that we are not sufficiently advanced as yet to tackle the ultimate questions about origins. At the very least, physics must first put its own house in order by explaining dark matter, dark energy, and the unification of gravity with the standard model. After that, when we have a coherent picture of our universe, even the formulation of the ultimate questions could look different.

Live Blood Cell Analysis

Thomas Patterson's article "The Pseudoscience of Live Blood Cell Analysis" (SI, November/December 2012) is a warning to "let the buyer beware," but unfortunately slighted alternative medicine (AltMed) because of the actions of some "ill"-informed practitioners who should rightly be criticized. During the last century, there were some medical doctors who recommended cigarette smoking as a means to promote lung health (http://tobacco.stanford.edu/tobacco_main/index.php). Do we therefore indict the medical profession because of the "ill" advice of a few physicians?

For example, Patterson mentioned that laboratory scientists can perform quantitative blood tests and for someone to use dark-field techniques to do this after only a couple of days of training is suspect. I agree, but college-trained AltMed practitioners use dark- and bright-field microscopes, had courses in microbiology, and look for patterns, not details as a clinical scientist would. To say that they can't ascertain patterns is like saying that only professional athletes can play or recognize sport trends.

Patterson also wrote, "The rouleaux observed by alternative medicine practitioners are almost always artifacts [how would he know that?] due to the slight drying of the blood sample around the edges of the cover slip. . . . The practitioner can show the customer whatever he or she wants. . . . " Here he's impugning practitioners in general as being unscrupulous people who would deliberately show an imagined problem with an edge view and then later switch to a central view to "show" how an alternative therapy had "cured" the problem. In my training, we were told specifically to discount the views at the edge of the cover slip.

Finally, he claimed "Conveniently, most of the serious-sounding conditions discovered by the practitioner" can be resolved by waving an "energy wand" over the body! AltMed practitioners are trained to refer anything remotely "serious" to a medical professional (e.g., physician). Energy medicine such as Tai Chi may help correct disturbances in a body's energy field to promote self-healing and is typically slow and accumulative in its effect. Waving a wand sounds like a scam.

Al Jang, N.D.
Certified in Traditional Chinese Medicine and Tai Chi, retired
South Pasadena, California

Tom Patterson replies:

I am not sure what is meant by alternative practitioners looking for "patterns and not details," but clinical laboratory scientists must look for details for a correct diagnosis. I know rouleaux are almost always artifacts because it is a common finding on live blood analysis but are very rarely seen on a properly stained blood smear and then only in patients with a blood protein abnormality. I am also not sure what alternative practitioners are looking at in their "microbiology" studies. In my thirty years as a clinical laboratory scientist I have yet to see bacteria on a peripheral blood smear. However, I can easily see them in a properly stained positive blood culture. I did not say that all alternative practitioners are ignorant of biological principles. However, if an alternative practitioner adheres to the outdated philosophy of polymorphism in which primitive protein particles evolve into bacteria or other microorganisms under different conditions in the body, then yes, the practitioner is less knowledgeable than a high school biology student. I know of no high school in the United States that teaches such nonsense. I did not address Tai Chi in my article so I am not sure why this was mentioned. It may have some value in the healing process but I have seen no scientific evidence that measures the energy fields that have been disturbed, how much they have been disturbed, and any objective evidence that they have been corrected.

A Crucial Point

"Science Writers Gone Wild?" ("Science Watch," SI, January/February 2013) was quite entertaining, but it failed to make a crucial point, which would have been appropriate for Skeptical Inquirer. Evolution does *not* develop any features or traits to serve a particular purpose. It does not think. It does not "sculpt the human penis." It does not understand whether something "is good" or "why something works." It does not

strive to develop optimal solutions.

Things just happen; and if the sum total of the advantages of a particular feature or trait somehow outweigh its disadvantages, and if they are slightly better than what the competition has to show, then that item will stick around—for a while.

Carlo H. Séquin
EECS, Computer Sciences
University of California,
Berkeley

True, evolution doesn't develop traits to serve a purpose, but column author Kenneth Krause notes that he did in fact make that point early in his article, when he wrote that evolution doesn't create perfect solutions "precisely because *evolution does not transpire by intelligent design. 'It occurs by selection. . . .'"*
—*EDITOR*

Math Behind Numerology Myths

Charles F. Cooper's Forum column "The Math Behind the Myths" (SI, January/February 2013) provided much food for thought. He notes that biblical scholars, using a "traditional Hebrew numbering system," believe they have identified the Anti-Christ intended by the number 666 as Neron Kaisar, noting that some manuscripts use the number 616, which would code for Nero Kaisar. Mr. Cooper, however, shows that by varying the numbers attached to letters of the alphabet one can transform a majority of names into 666. However, it is unlikely that the author of Revelations was so prophetic as to be naming Hitler or Kissinger. It seems more likely that in the days of Christian persecution he was subtly calling Nero, or some other Roman persecutor, a "beast" and was avoiding naming the person directly for fear of being crucified himself. If we assume that the author of Revelations had someone specific in mind, we need to take into account the historical context and consider only those names that might fit and not consider all names that may fit a mathematical formula.

We all attach meanings to numbers that go beyond their simple mathematical value. I have found it is fun to look at the numbers on a digital clock and see what meaning or pattern I can find in them besides the time of day. This may be called Digital Clock Numerology. If nothing comes to mind, wait a minute or two. One becomes more proficient with practice.

David W. Briggs
Marion, Massachusetts

Lose Some, Win Some

I was among those dismayed by your publication of Chris Mooney's "Why the GOP Distrusts Science" (SI, July/August 2012) and your ongoing defense of it. When you single out a subgroup like this, whether it is conservatives, gays, African Americans, or women, you need to exercise more care.

I am a politically conservative skeptic and longtime supporter. I am the "Trimberger" who funds the SETI Institute's "Skeptic Check" broadcast. I put real money and energy into this fight. But no more will go to you.

So, no "sarcasm or anger" (Editorial, "Can We Have Civilized Conversations about Touchy Science Policy Issues?" SI, January/February 2013), Mr. Frazier. Simply cancel my subscription. I do not wish to be associated with your organization any longer.
Stephen Trimberger
San Jose, California

Kudos to the editors for not knuckling under due to criticism from some of your subscribers regarding your article about the Republican mistrust of science. As the best-documented example supporting this claim, I am a longtime member of the National Center for Science Education, and I keep up on their legislation watch. Almost all of the sponsors of legislation aiming at suppressing evolution and climate change in the schools are Republicans. While the bills do get bipartisan support, it is the Republicans who are pushing the agenda. I don't recall any of the letter writers having addressed this.

Thanks again for the great magazine and for sticking to your guns.

Seth Bradley
Hood River, Oregon

Bee-fuddled

I hope you won't think me waspish if I call your attention to the picture illustrating the bee article on page thirty-one (SI, January/February 2013). Wasps and bees really are rather different!

All good wishes.

Richard Dawkins
Oxford, U.K.

Benjamin Radford's Skeptical Inquiree article "The Mysterious Bee Deaths" has an incorrect illustration. The photograph is of an Eastern Yellowjacket (Vespula maculifrons), which is a wasp, not a honeybee (Apis mellifera).

Ray C. Telfair II
Certified Wildlife Biologist
Whitehouse, Texas

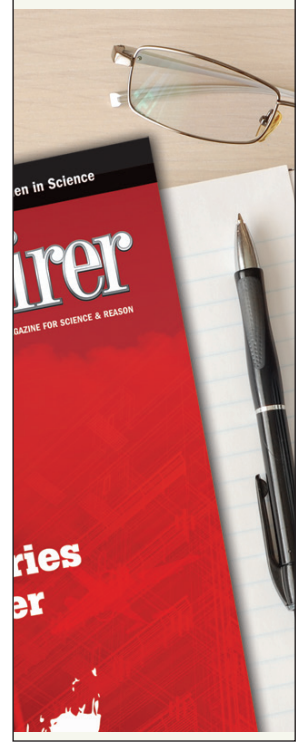
I enjoyed the informative article on honeybee deaths, but I must point out that the accompanying photo is of a yellow jacket type of wasp and not a honeybee.

Alden McBee
Wheeling, West Virginia

Many readers beelined to their computers to write us. As our correction in the March/April issue (p. 65) is titled, "Ouch! That Stings." But bee of good cheer; we won't bee doing that again.
—*EDITOR*

[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@csicop.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.



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HIDDEN MESSAGES by Dave Thomas

The following letters are a simple substitution cipher. If R stands for L, it will do so everywhere. Solution is by trial and error. Hint: Look for patterns in words; for example, the scrambled phrase "JRXJ JRQ" might represent "THAT THE."

PUZZLE

"CYM HNMDCMBC MGMPE KQ UGKLZMVHM FB GKC FHGKNDGTM, FC FB CYM FZZSBFKG KQ UGKLZMVHM."

—BCMJYMG YDLUFGH

CLUE: S = U

ANSWER KEY

As you decipher letters, keep track of them with the handy answer key below. If you've decided that R stands for L, simply write down an "L" above or below the "R" in the alphabetized row below, just as you would for the cipher itself. This builds a handy, easy-to-use reference guide for you and will also reveal the "Super Secret Word," a puzzle within a puzzle!

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

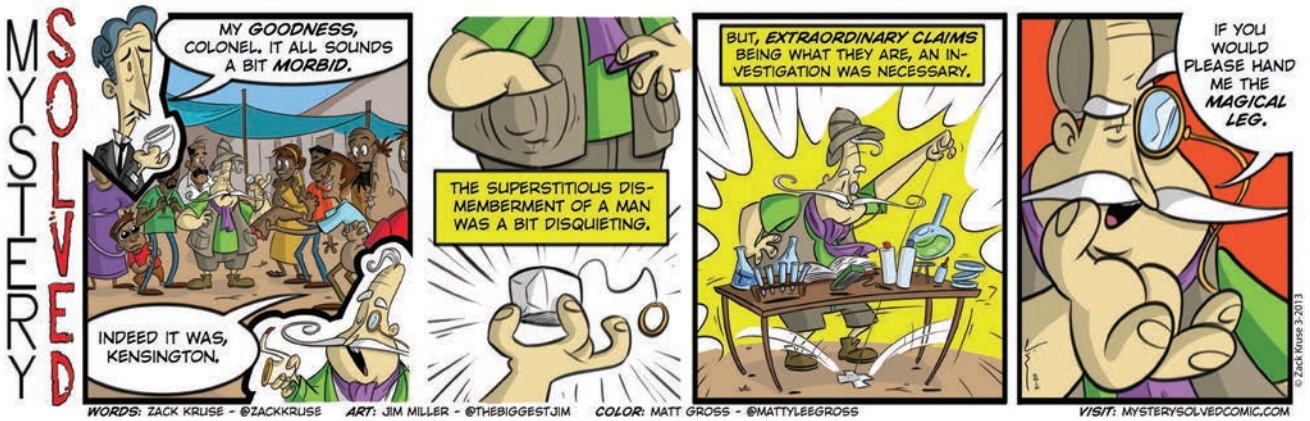
PREVIOUS PUZZLE SOLUTION (September/October 2012): ***"I AM PATIENT WITH STUPIDITY, BUT NOT WITH THOSE WHO ARE PROUD OF IT."***

—EDITH SITWELL

SUPER-SECRET WORD: PATHFINDER

(Instructions: www.nmsr.org/secretword.htm)

STEPHEN FRY
SKEPTIC TRUMPS
Prince of Twitterland, Polymath, Homo Universalis, last ever Pipe Smoker of the Year and the official UK National Treasure.
SPECIAL POWER
The power to bring down a server with a single tweet
94%
WEAPON OF CHOICE
A London Taxi an iPhone and a MacBook
85%
KEY OUTPUT
A Bit Of Fry and Laurie, The Liar, Black Adder, Making History, Last Chance to See, Wilde, Qi
99%
ARCH NEMESIS
Cyclothymia, Champagne, bumble bee stings and ladies front bottoms
95%
Illustrations by Neil Davies http://www.caricatureclub.co.uk/
Cards by Crispian Jago http://www.crispian-jago.blogspot.com/


MYSTERY SOLVED
MY GOODNESS, COLONEL. IT ALL SOUNDS A BIT MORBID.
INDEED IT WAS, KENSINGTON.
THE SUPERSTITIOUS DISMEMBERMENT OF A MAN WAS A BIT DISQUIETING.
BUT, EXTRAORDINARY CLAIMS BEING WHAT THEY ARE, AN INVESTIGATION WAS NECESSARY.
IF YOU WOULD PLEASE HAND ME THE MAGICAL LEG.
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The organizations listed above have aims similar to those of the Committee for Skeptical Inquiry but are independent and autonomous. Representatives of these organizations cannot speak on behalf of CSI. Please send updates to Barry Karr, P.O. Box 703, Amherst NY 14226-0703.
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